East Engin. Lib. OCT 20 1925

Rock Products

With which is Incorporated CEMENT and ENGINEERING NEWS

Founded 1896

Chicago, October 17, 1925 (*Issued Every Other Week*) Volume XXVIII, No. 21

Down in Florida—

Down in Florida five Plymouth Gasoline Locomotives are working like a shuttle in a loom at the quarries of the Ocala Lime Rock Co.

One of these Plymouths has been in use 18 months; two 12 months and two for six months.

Repeat orders tell the story. From Maine to California, from Minnesota to Florida, the Plymouth is the quarryman's favorite.

Write for literature

THE FATE-ROOT-HEATH COMPANY
Plymouth Locomotive Works
PLYMOUTH, OHIO

OCALA LIME ROCK COMPANY
Incorporated
OCALA, FLORIDA

August 11, 1925.

The Fate-Root Heath Co.,
Plymouth, Ohio.

Gentlemen:

We are using two 4-ton Plymouth Gasoline Locomotives for hauling lime rock cars to and from the steam shovels in our quarry near Kendrick, Fla. We also operate two 4-ton and one 7-ton Plymouth Gasoline Locomotive at our quarry near Santos, Fla.

All five Plymouths have given perfect satisfaction. We have had scarcely any repair bills and if we need additional Locomotives we will consider Plymouths ahead of anything else.

Yours very truly,
OCALA LIME ROCK COMPANY.
(Signed) By C. G. Rose,
Sec'y-Treas.

PLYMOUTH
Gasoline Locomotives

MEMBER A.B.C. *The Only Paid Circulation in this Industry* MEMBER A.B.P.

Printing of This Issue Is 5100 Copies. Next Issue Will Be October 31

Ingeniously devised. Carefully manufactured. Accurately assembled and tested.

All to produce the conveyor carrier which will operate with unusual smoothness and effect startling power economies.

This Sacon Carrier has struck a note of instant popularity with conveyor operators.

Send for Bulletin 143-R

STEPHENS-ADAMSON MFG. COMPANY
AURORA, ILLINOIS
PACIFIC FACTORY—LOS ANGELES

STEPHENS-ADAMSON
S-A BELT CONVEYORS

Rock Products
With which is Incorporated CEMENT and ENGINEERING NEWS
Founded 1896

Vol. XXVIII | Chicago, October 17, 1925 | Number 21

The Cleves Plant of the Ohio Gravel Ballast Company

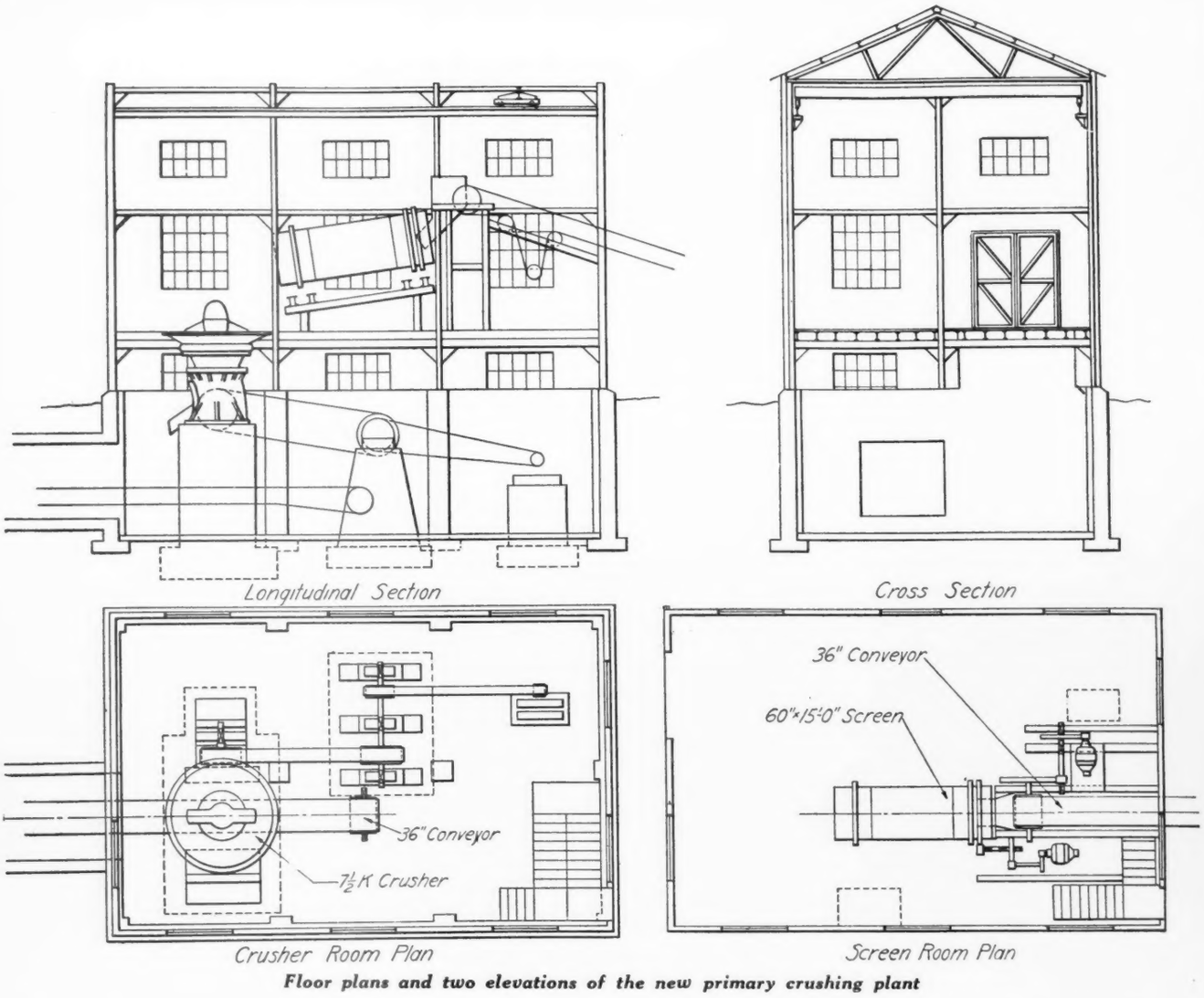
One of the Most Noteworthy Developments in Sand and Gravel Production This Year

Cleves plant of the Ohio Gravel Ballast Co., near Cincinnati, Ohio

THE Cleves plant of the Ohio Gravel Ballast Co. is one of the most noteworthy installations of 1925, especially from an engineering point of view. It is an ingenious way of combining the material from two deposits in order to grade the plant product to fit the demand of the market. It is also noteworthy as the solution of a transportation problem, as one of the deposits is situated at a considerable distance from the other (on which the washing plant is situated) and the conditions were such that ordinary means of transportation, such as cars and locomotives, were quite out of the question. The plan was worked out by W. R. Purcell, chief engineer of the company. The conveyors and other machinery (except as stated) were furnished by the Webster Manufacturing Co. of Chicago.

The plant is at Cleves, which is just outside of Cincinnati on the main line of the B. & O. railroad. The deposit which the plant was built to work originally is on the same side of the railroad. The deposit which it was proposed to work in addition to the original deposit, in order to get a wider range of sizes in the material and to add to the daily production, lay on the other side of two railroads, an interurban electric line and a concrete highway. To bring material from both deposits to the plant offered a nice problem, especially as railroads are rather particular about the kinds of structure and transportation methods that cross over their lines. A long belt conveyor system was selected as the means best adapted to the conditions.

The material on the newer deposit was coarser than that near the plant and a crushing plant had to be included in the scheme. The original plant had an excellent crushing equipment consisting of a Kennedy



Floor plans and two elevations of the new primary crushing plant

gearless crusher, a No. 5 Allis-Chalmers and a Symons disc crusher. The new crushing plant which delivers its product to this system had therefore to crush its product only to 4-in., which brought it down to a good size for conveying and obviated the crowding of the original crushing plant. Consequently it was logically placed at the start of the long conveying system.

The newer deposit is worked with a Marion No. 70 steam shovel and the excavated material loaded into 6-yd. Western side dump cars which are drawn to the plant hopper by Davenport steam dinky locomotives. The hopper is below the track. It is 20x20 ft. and at its apex is a feeder by which the material is fed to a 36-in. conveyor belt 153 ft. centers, and provided with gravity take-up which lifts it to a chute that delivers it to the scalping screen. This screen is 60 in. in diameter and 15 ft. long and has 4-in. round hole perforations. It is borne on four trunnion wheels and is driven by a pinion on a gear on the feed and through a silent chain drive. The conveyor drive is also by silent chains.

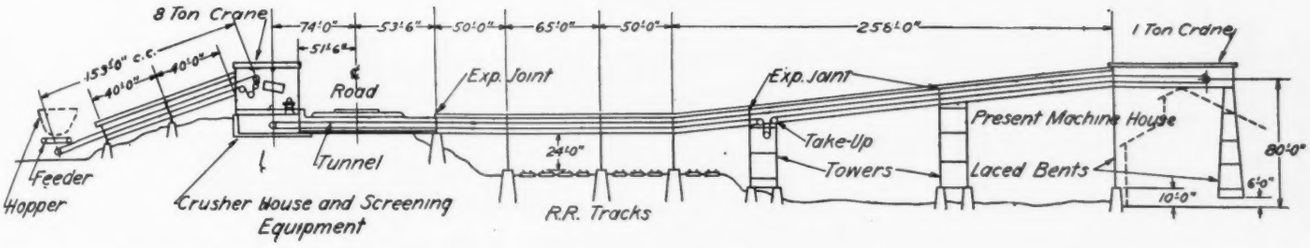
The screen is extended by a blanked section to serve as a chute. This delivers all the oversize to a No. 7½ Allis-Chalmers gyratory crusher, which is set below the floor. The undersize of the screen falls through a steel chute to the plant elevator and the product of the crusher joins it a short distance beyond. There is no return from the crusher to the screen as none is needed for product that is to be sized and crushed again.

This plant elevator is one of the longest which has been installed in any plant, as it is 658 ft. between pulley centers. It is horizontal for 292 ft. and then it follows a gentle incline for 310 ft. The remainder of the distance it is horizontal where it runs over the roof of the plant to the plant hopper. In the first part it runs through a tunnel under the concrete highway about 100 ft. long. When it emerges from this it is at a sufficient height to clear the tracks and here it is supported on a steel trestlework carried on steel towers. The horizontal stretch that passes over the roof of the building is 80 ft. above the ground and is carried on steel towers which are independent of the building.

A noteworthy feature of this installation is that a 1-ton crane is placed about the head pulley and drive so that any part can be lifted in case it is necessary to make repairs. An 8-tone crane is placed in the new crusher house where it can lift any part of the crusher or screen. All the electrical equipment was manufactured by the General Electric Co. Cranes were furnished by the Armington Engineering Co., Euclid, Ohio.

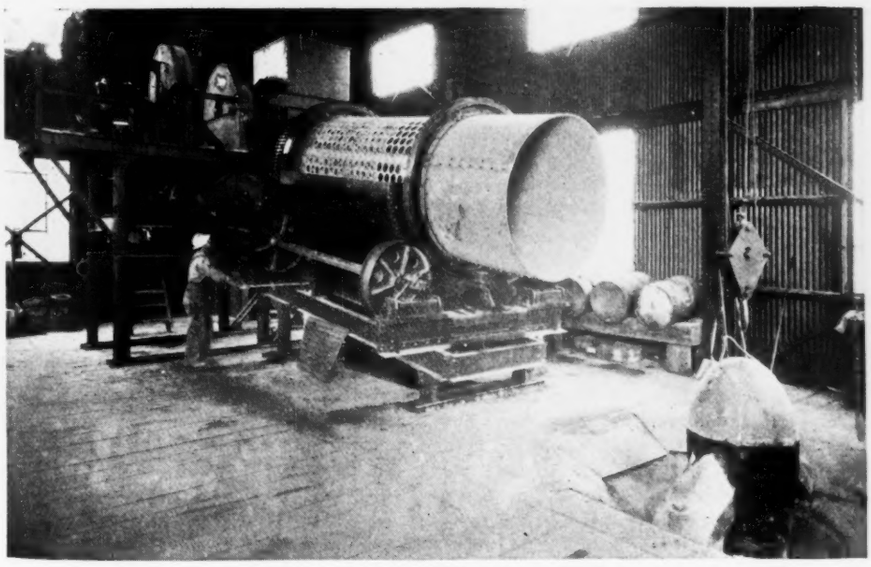
The output of the plant is now 5000 tons per day. The original plant was designed for 3000 tons per day but has often shipped in excess of 4000 tons before the additions described here were made.

The Ohio Gravel Ballast Co. is one of the largest sand and gravel producers of the country, and its founder, Dan Donnelly, was one of the pioneers in the gravel industry of the United States. His son, Harry Donnelly, is president of the company. Another son, Edward Donnelly, is vice-president and treasurer. Earl Zimmerman is vice-president and general manager, and W. R. Purcell is chief engineer. The company operates three plants in the vicinity of Cincinnati. As its name indicates, it is a large producer of

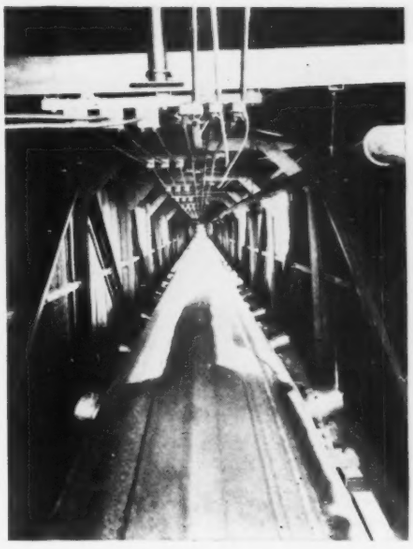


Section of new conveyor installation, which passes under a highway and over main-line railway track

Pit and crusher house of Cleves plant of the Ohio Gravel Ballast Co.



Scalping screen in crusher house



Conveyor belt gallery, which connects newly opened deposit to old part of plant

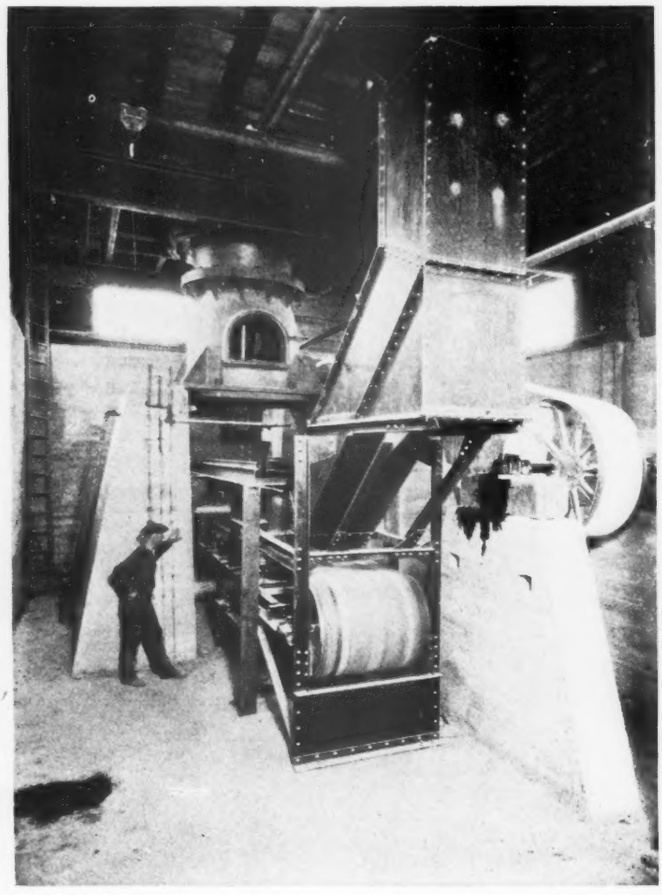
washed, crushed and screened gravel for railway ballast, and those who remember Mr. Zimmerman's papers on the subject at the conventions of the National Sand and Gravel Association know that he has had much to do with standardizing and stabilizing the gravel ballast industry. He is chairman of the ballast committee of the National Sand and Gravel Association, in the October *Bulletin*.

"With this feature disposed of, the railway committee explained their newly adopted specifications for stone ballast required certain testings of the material, such as wear or durability, quick weathering, absorption, and test for maximum and minimum sizes.

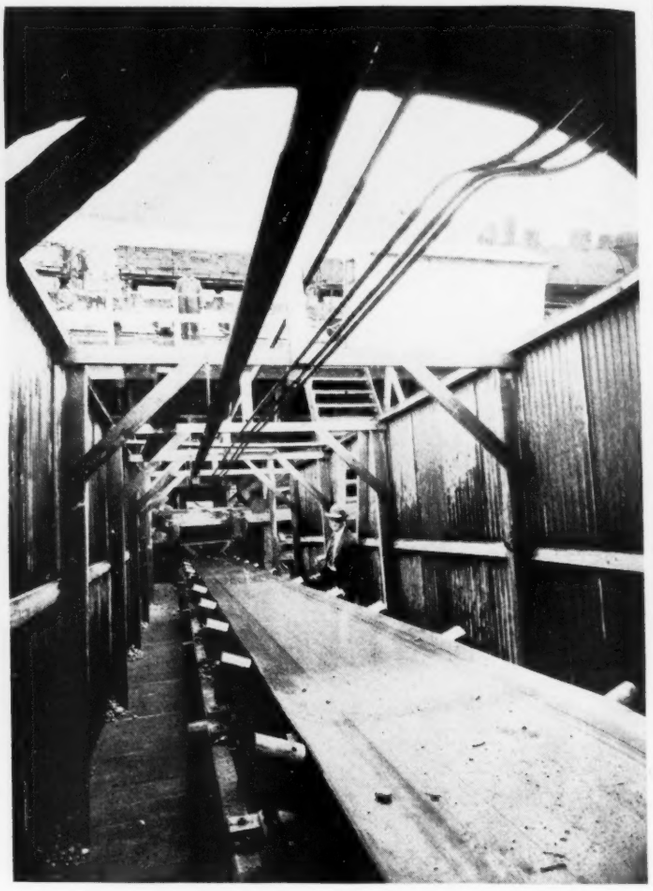
"It was agreed that the 'wear or durability' test should also be incorporated in the gravel ballast specifications, which is a laboratory test and made by taking a sample of gravel passing a 1¾-in. ring and retained on a ¼-in. ring, thoroughly dried, carefully weighed, and then subjected to what is known as the tumbler or rattler test of some severity to determine the loss by abrasion, which is obtained by the re-weighing of the material after its removal from the rattler.

"The washed gravel ballast committee desired that this test be included in the specifications, for the reason that it will result in even better evidence of the advantages of using washed gravel ballast. As a rule, our committee believes that gravel shows up considerably better in this test than stone. At the same time we can expect it to be more uniform throughout the country than the various stones used will test.

"I suggested at the meeting that our committee would be glad to make a number of tests and to report at the next meeting, which will be held in Washington early in November. The railway committee will also conduct certain similar tests and from these tests, which will be reported at the next meeting, will come a determination with respect to writing that part of the washed gravel ballast specifications which relate to the 'wear test.' It is necessary to make these tests now since there is no complete record of such tests which will permit the committee to write intelligently into their specifications what maximum loss would be permitted from a 'wear test'."



Primary crushing unit and by-pass for scalped material



Conveyor gallery coming from the pit receiving hopper

the ballast committee of the National Sand and Gravel Association. But its production is by no means confined to ballast, as it is the largest producer of sand and gravel for concrete aggregate and like purposes in Cincinnati. The offices of the company are in the Union Central Bldg., Cincinnati.

Progress on Standard Gravel Ballast Specifications

AFTER a considerable discussion in the light of all the evidence at hand, the railway committee decided to retain and recommend sizes as agreed upon tentatively at Chicago; that is, all material to pass a 1¾-in. ring and be retained upon a 1/10-in. mesh. It will be readily noted, of course, that this guarantees a top size of fully 1½-in. gravel. There would be a very small percentage of gravel which might be slightly larger in dimensions than 1½ in., but, generally, the ballast would be considered as 1½-in. down to 1/10-in.," reports Earl Zimmerman, vice-president of the Ohio Gravel Ballast Co., chairman of the washed gravel

Arrow Sand Makes Extensive Improvements

THE Arrow Sand Co. of Columbus, Ohio, has completed a number of improvements which enhance the efficiency of its plant. A caterpillar crane has been installed to handle material for outside storage and, in addition, a portable bucket loader has been put into use. These improvements, together with an additional sand sifter of 300-ton capacity, brings the plant up to a high degree of efficiency.

The company's plant is located at Grandview avenue, and offices are maintained in the Hartman building. Officers of the firm are: H. J. Kaufman, president; Stephen Stephanian, vice-president and general manager; Robert H. Pausch, secretary, and W. H. Hoagland, treasurer.

Cost Finding and Its Problems in the Sand, Gravel and Quarry Industries

VI—Labor Records for Sand and Gravel Plants

By Alfred Baruch
Consulting Industrial Engineer, New York City

LABOR records form the basis for all cost calculations. As a rule the indirect expense is proportioned to the productive labor hours. When the operator estimates the cost of work for which he has no precedent, he takes the labor time as the measure of the cost, since the cost of excavation will vary in direct proportion to the time spent upon it. Labor records are therefore necessary for the sake of getting a measure for the work and for maintaining control so that the cost does not outrun the price.

The first need in establishing a wage system is to know how much each man or gang should do in one day. Once this standard is established, a method of paying wages must be determined if the choice is in the employers' hands. Fundamentally, there are only two ways of paying labor. The first is to pay for the man's services during a fixed period of time. The second is to pay for the quantity of work regardless of the time it takes. These two methods are referred to as the day-wage and the piece-rate plans of payment respectively. The day-wage plan is usually represented by a fixed price per hour and the other by a fixed price per piece.

The difficulty with the time payment method is that there is no direct control between the amount of work done and the wages. A man is hired to put in his time and it is up to the foreman to see that he does not shirk. If the demand for labor is big and the supply small, as it usually is during busy seasons, the worker may soldier on the job and still run little risk of losing it. Wherever the day-wage system is used supervision must be proportionately greater because there is no fair method by which a man can be penalized for not doing as much as is expected of him.

Advantages and Disadvantages of Piece Work

However, there are many classes of work in quarrying that cannot be put on a piece rate basis because an individual's job may require many duties and a piece rate is based on uniform operations. Again the men may have a very strong union which will not agree to the piece rate under any conditions.

The last statement would make it appear that the piece rate is something that the employer tries to put over as long as the union will let him. As a matter of fact, the piece rate is the fairest method of payment both for the employer and the employee provided both parties act in good faith. The simplicity of the method is one of its strongest recommendations.

Outline of Articles

THESE articles describe a system designed especially for the rock products industries and are elaborated by descriptions of the use of each part of the system with examples of the forms and records that must be maintained.

ARTICLES ALREADY PUBLISHED

No. 1. Introduction. (The meaning of costs, the uses of a cost system, the advantages of uniform cost methods in a competitive group, and definitions of cost terms.)—June 16, 1923.

No. 2. Classification of Materials and Expenditures. (A system of symbol identification of materials and expenses that make the distribution of costs automatic.)—June 30, 1923.

No. 3. Estimates and Orders. (The use of an estimate sheet and the control of production through the proper routing and follow-up of orders.)—July 14, 1923.

No. 4. Material Charges—August 11 and September 8, 1923.

No. 5. Labor Records—This issue.

ARTICLES TO BE PUBLISHED

No. 6. Collection and Distribution of Burden.

No. 7. Proper Application of Burden Charges.

No. 8. Cost Reconciliation and Monthly Reports.

No. 9. A Hypothetical Case of Cost Operation in the Rock Products Industry.

It takes into account the difference between workers so that the most efficient man will get the highest rewards. The method is less expensive because little supervision is required where men get paid on the basis of good work completed. The piece rate makes it easy to forecast the cost of future operations.

However, the method has some disadvantages. In the first place, many plant operators cannot set a piece rate properly since they do not maintain production records or make time studies. They cannot determine with any fairness to themselves and to the worker how much a man can do in one day and therefore how much he should be paid per piece to earn a fair wage. Another objection to this system is the fact that the employer is often tempted to cut the rate when he thinks his men are beginning to make too much money. If the rate is too high at the beginning it is usually the employer's fault for not getting the proper information before setting the rate. Nothing antagonizes the worker more than to have his rate cut after he has managed to increase production by extra work. He feels that he has been betrayed into working for less money at top speed.

The ignorance on the part of the operator as to what constitutes a proper day's work is so general that it is necessary to discuss the methods of obtaining this information before going on the cost records themselves.

Determining Piece-Work Rates

The two methods most commonly used are production reports and time studies. F. W. Taylor, when he was with the Bethlehem Steel Co., showed the way to increase production by means of time studies. His first step was to remove all possible obstacles from the path of the worker. All supplies and equipment were arranged for so that there would be no delay to the molders or oremakers. For example, the molders did not pour off their own castings but went on making molds while the metal was being poured by a less skilled and lower paid man.

Then each man was taught the operations he was to perform. After he had been thoroughly trained and arrangements

made so that he could work under the best conditions possible, time studies were made and the piece rates were based on them. This same thing could be done by substituting the daily production reports for the time studies. The difference is that the time studies analyze operations and permit estimating on work that was never done before simply by a breakdown of the operations.

The Bonus System

Another method of wage payment that has been adopted in many plants with some success is the task with a bonus. This is a combination of the two primary methods. The men are paid day-wages. They are also assigned a task, that is, a definite number of tons to deliver to the screen in a day. If they fill their quota or less they are paid full wages. If they exceed it, they are given a bonus of approximately 30%. For example, a shovel gang may be given the task of excavating and loading 450 tons of sand per day, which would mean approximately 50 an hour for them. For these each man gets paid at the rate of $1.75 per hour. If they should load 600 tons a day, each man would get 25 cents extra.

The method assumes that a man ordinarily works at about 67% efficiency and that by proper stumulus he can be brought up to 100%. This plan requires a good deal of clerical work. Besides, it is only a variation of the piece rate method except that it does not give the man everything he earns. However, it is an excellent plan where the work requires constant changing from piece rate to day wages.

Labor Records

Labor records have two important functions: the first is to establish the cost of production; the second is to account for labor time and wages. The first feature provides the basis for estimating the cost of work and for control over cost and production. The second takes care of the payroll. Consequently, the mechanism that is devised to secure the information as to labor operations and the payroll must have these two functions in view. Aside from this, the only consideration is a way to design records that will be suitable to quarrying.

There are three methods that may be used by the operator. One is the individual daily time card. The second is the individual order card, and the third is the daily time sheet made out by the foreman. The daily time card is a separate card for every man showing the tasks he worked at and the time spent on each. It shows the name of the man, the date, the department and the clock number. The body shows the charge number, the quantity of work done and the elapsed time. The bottom of the card shows the rate, the total pay and the clerk's check. The order card reports every task on a separate card. Those men who work at the same task always need turn in only one card per week so that the payroll can be made up. Those who work at more than one task make out a separate card for each one. This means that each operation must be given an order number so that all labor charged to it can be collected.

This card must show the worker's number, the date, the location of his workplace, the order number, the quantity completed, the time spent in preparation for the task, the elapsed time, the rate, the amount and the foreman's signature. Although this is an excellent method for getting the operation labor costs, it involves much clerical effort, as can be seen.

A simpler method that accomplishes the same end is the time distribution sheet made out by the foreman. This is a wide sheet containing the names of the workers for each department down the length of the sheet and the columns headed by the order numbers across the width.

This sheet also shows the man's rate and thus makes it possible to find how much he has earned each day by adding the number of hours in line with his name and multiplying the total by his rate. The total time chargeable to each operation will be found at the bottom of the sheet after the column has been totaled.

If it is desired to express this time in terms of money, it is necessary to multiply the hours by the labor rate. If more than one man works on one operation and their rates differ, the hours that each one puts in must be multiplied by his own rate and the result added to that of the others. However, even this extra multiplication can be eliminated by the use of standard rates which will be discussed later on.

Payroll Distribution

The above takes care of the charges to the individual operation. In crediting the man with his time the entry is made on a payroll sheet specially designed to suit the purposes of the plant. This sheet contains the man's name and his clock number. It shows the number of hours he has worked on each day of the week. These hours are totaled horizontally and in the next column multiplied by the rate so as to give the amount of wages due him at the end of the week. The remainder of the sheet is divided into columns indicating the distribution of the time as office salaries, general labor, shovel men, etc. These columns are totaled at the bottom and their sums should equal all the salaries and wages paid that week. This information is kept in a special time book with loose-leaf sheets and is not a part of the general books. The only entry to be made in the latter is a charge to the payroll and a credit to cash.

The above discussion has presented all the possible methods for reporting the time of labor and getting the cost of operation on each operation. It is not advisable to have the men fill out their own time reports. They usually resent any clerical work as being something more than they bargained for. Besides, their reports are very unreliable and can hardly be made the basis for charging costs to an operation. It is best to have the foreman make out the time reports himself. He is familiar with the work and can get an accurate report very quickly, especially if he uses the distribution-of-time sheets described above.

Standard Labor Charges

This makes no provision for the time spent on operations in each department. But the rest of the departments will work more or less time on each operation, depending on its complications and the specifications. This information is required chiefly as a basis for estimating on future operations. This requires setting up of a standard rate of production which can be used for charging departments. This standard is arrived at in two ways:

1. Time studies made with a stop watch.
2. Time studies made by special reports.

Time studies made by a stop watch are by far the most scientific. They record the individual motions and the length of time required to make each one. The total of the time required for the separate motions make up the time for a completed operation. A series of these studies would establish definite standards, which with a margin for safety, are bound to be right. The other set of time studies can be made by special reports. Whenever an operation is large enough to have many similar units, it is possible to make a rough time study and check it up against the run. This would give the time required for that type of work with fair accuracy.

After building up a set of standards for each operation, the operation is charged automatically with the standard time and the standard labor cost regardless of actual reports or conditions. The theory behind this method of charging time to the operation is that any loss in time occurring on one particular time should be charged to the work of all time unless it is known that this loss of time was caused by the peculiar nature of the work itself. It will be found that by charging each operation with the standard rate no loss from labor is incurred during the year and all the trouble of individual time reports is eliminated. The procedure is as follows: The bookkeeper would at once charge the operation with the standard labor rates and the standard burden rate for each type of work. Now it may happen that the whole operation takes less time than the standard allowed for it. In that case the balance between the actual and the standard time can accumulate as a reserve against operation that require more than the standard time. This re-

serve, of course, is expressed in terms of money.

This method of charging costs is known as budget costing, that is, each department is placed upon a budget and made to keep within its limits. But in case it exceeds it, that particular department is not made to pay the penalty since it in itself is not at fault. The loss is distributed over all departments or else it serves as a charge that has been accumulated from operations that took less than the standard time. The standardization of rates means the standardization of operations and this invariably produces lower costs.

When individual time cards are used for each operation the same procedure as in the case of the time sheets is followed. The time on the card is entered on the payroll sheet and then the cards are filed behind their order numbers in a special file maintained for that purpose. This is a very simple way of collecting all labor charges against an operation since all cards bearing the same order number are collected behind that number in the file and as they have already been charged to the payroll these cards can be extended and totaled at the time when the cost of the operation is being determined or a financial statement is being drawn up.

(To be continued)

TIME REPORT

NAME..... NUMBER.....

DEPARTMENT..... DATE.....

FOREMAN..... CHARGE NO.....

OPERATION	Time Started	Time Finished	Elapsed Time	FOR OFFICE ONLY Rate	Amount

DISTRIBUTION OF TIME

DEPARTMENT..... DATE.....

NAME	RATE	ORD. No. Hours	Amount	ORD. No. Hours	Amount	ORD. No. Hours	Amount	ORD. No. Hours	Amount	TOTAL HOURS	TOTAL AMOUNT

Illinois Gravel Deposits to Be Developed

THE following letter received from A. H. Hopkins of Hopkins and Chaffee, Clinton, Iowa, relative to the developments of gravel deposits in Illinois is of interest. He writes:

"Hopkins and Chaffee, Clinton, Iowa, have recently purchased the Cassidy farm situated one mile south of Savannah, Ill.

"On this farm there is an inexhaustible supply of the finest gravel in the state of Illinois, pronounced by eminent engineers 99.2% pure, running about 50%, very coarse sharp sand which is ideal for concrete and road work. The property lies 1½ miles east of the Mississippi river and is situated between the C., M. & St. P. railroad and the C., B. & Q., the former within 100 yd. of the pit and the latter within 300 yd.

"The product of the pit is thoroughly washed. Imagine the world's largest washing machine. Every time the water rises in the Mississippi river it rises in the pit and this action has been going on since the glacial period, with the result that every particle of foreign substance and silt has been taken out by the continuous rise and fall of the water.

"Hopkins and Chaffee will commercialize this deposit by putting in the necessary trackage, pumps and sorting facilities and by early spring will be in shape to produce 25 to 30 cars of washed product a day. Electrical power is easily available and the plant will be operated by this power. The owners have perfected a granite faced concrete block which will be built in eight or 10 different varieties and when ready for the market next year will constitute the cheapest and best building material known.

"Plans are also going forward for the election of an immense concrete brick plant which will be in operation by July, 1926.

"Geologists estimate the depth of this deposit at 400 ft. and there are more than 40 acres of it, 50-50 washed gravel and sand."

Southern Sand Company Settles Gravel Dispute

THE suit against the Southern Sand Co., Little Rock, Ark., filed in Chancery Court by the state for $25,000 for the use of gravel from the bed of the Arkansas river was dismissed by Chancellor J. E. Martineau by agreement of both parties. The dismissal was ordered after a settlement had been made to W. E. Floyd, commissioner of insurance and revenue, for $1,000. The state alleged that the sand company had been removing sand from the bed of the Arkansas river since 1916 without a permit.—*Little Rock (Ark.) Gazette.*

Gravel Company Files Protest Against City Condemnation of Plant

THE Brazil Sand and Gravel Co. of Brazil, Ind., has filed with the city clerk a remonstrance against the action of the city council in condemning four and a half acres of land on the Hill place on which the company has a lease for the operation of its sand and gravel deposits.

The company maintains that the city's action has damaged them to the extent of $50,000, while the city's appraisers awarded them but $400. They also claim no attempt by the city to purchase the plant before condemnation, an act which is contrary to the laws. Further, there is no real public necessity for the city to acquire the land.

The city of Brazil recently condemned the 4½ acres surrounding the city's driven wells on the Hill land, claiming that it was necessary to prevent the water supply from being interfered with. Later, appraisers were appointed by the council, who fixed the amount of damage to which they decided the Brazil Sand and Gravel Co. was entitled by reason of the city's taking this tract of land and removing it from the operations of the company. The appraisers also fixed the amount the Hill estate was entitled to as the purchase price of the land.

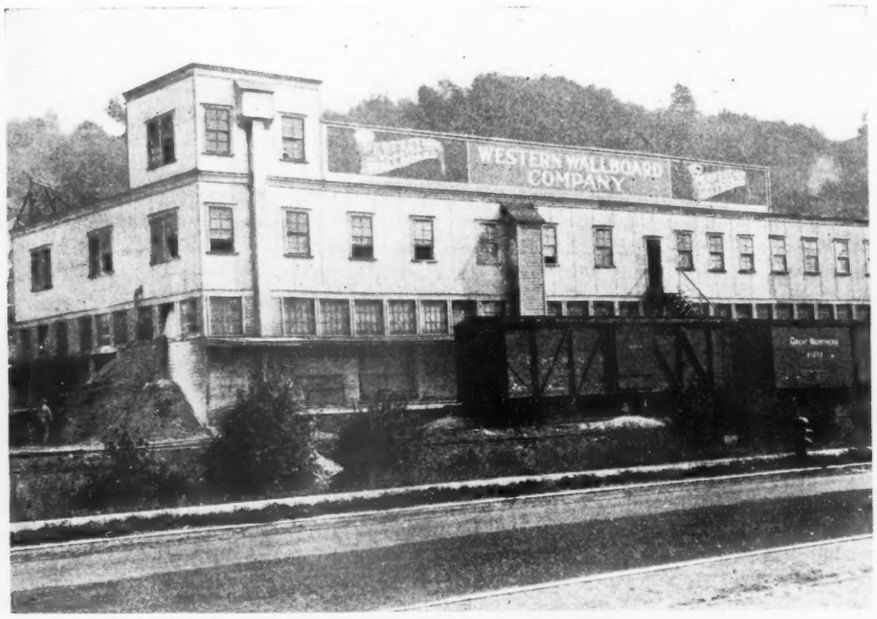
The company also claims that by excavating the sand and gravel on the property and allowing the excavations to fill with water, they are carrying out the recommendations of the city engineers for insuring a supply of water.—*Brazil (Ind.) Enterprise.*

The Gypsum Products Industry of Seattle, Washington

Wideawake and Enterprising Men are Building Up a Truly Great Industry

By Edmund Shaw
Editor, Rock Products

SEATTLE has two gypsum wallboard plants and a plaster mill which will begin operations shortly. The Western Wall-



Factory of the Western Wall-Board Co., Seattle, Wash.

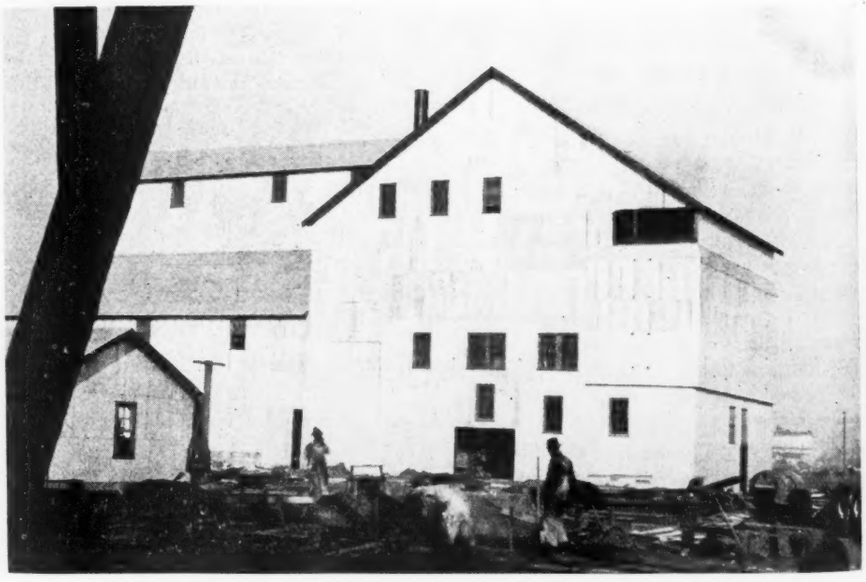
board Co.'s plant has a capacity for 200,000 ft. per day and the Schumacher Wallboard Co.'s plant about the same. The latter is building an addition to its building at the present time and adding considerable equipment. It is said that the total cost of these improvements will be about $300,000.

The plaster mill is being built by the Standard Gypsum Co. of Seattle which consolidated with the Pacific Gypsum Co. a short time ago. The Pacific company had its plant in Tacoma and drew its supply of crude rock from mines in Alaska. The new plant will get its gypsum rock from Mexico. The company has the mine already in operation and will barge the product to Seattle, a distance of about 3000 miles. The mine is on San Marcos island, which is in the Bay of California and not so far from the Mexican city of Mazatlan.

This seems a long way to bring gypsum rock but S. H. Perkins, the chairman of the board of directors of the Standard company pointed out to me that the conditions for importing it were quite as favorable as on the Atlantic Coast, where gypsum rock has been brought from Nova Scotia to New York for a long time. The southern end of the Pacific trip is through waters in which storms are practically unknown. North of San Francisco there is rough weather at certain times of the year, but these periods of bad weather are not long. The mine is on tidewater so that the rock (crushed to 3-in. size) can be loaded directly on the vessels and the unloading will be at the company's own dock at Seattle.

To receive the cargo the company has built a storage shed 240 ft. long, 70 ft. wide and 40 ft. high at the dock. A 30-in. Link-Belt conveyor will bring the cargo into the shed and another of the same width under the floor will take it to the plant. Everything will be under cover so that there will be no chance of the gypsum getting wet. No dryers have been installed in the plant, for in the dry, hot climate of that part of Mexico everything is dried out about as thoroughly as it can be. By using care, the rock can be kept dry throughout the handling from the ship to the calciners.

The plant has two kettles and oil will be used as fuel. Only plaster and land plaster will be made. The grinding of gypsum for land plaster is expected to be an important part of the operation.



Calcining plant and plaster mill of the Standard Gypsum Co., Seattle, Wash.

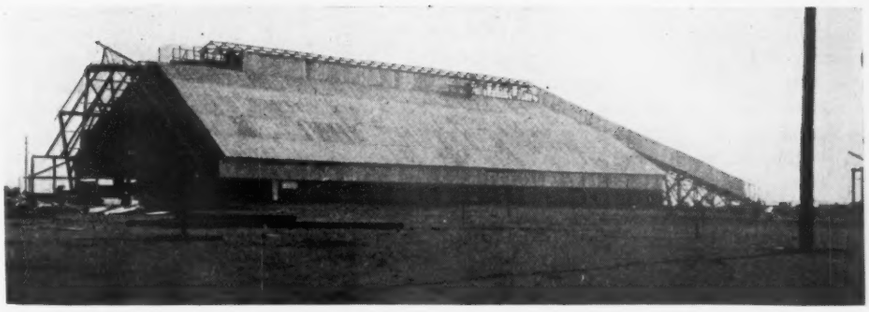
A description of this plant is being prepared for an early issue of Rock Products.

The wall-board plants have to import their gypsum as plaster and a good deal of it is brought in from the plants of the Hanover Plaster Co. at Hanover, Mont., and the Jumbo Plaster Co. of Sigurd, Utah. There are, so far as I could learn, no gypsum mines in Washington, although there are said to be workable deposits north of Spokane. Just across the line, in British Columbia, there are good deposits which are worked by the British Columbia Gypsum Co. and some of the rock is exported to the United States. It is a very white rock and almost pure gypsum. The same is true of the Mexican rock which the Standard company is importing from Mexico. This runs 98% gypsum.

I was shown a sample of a curious gypsum rock from Cranbrook, B. C., which is north of Spokane and a short distance from the international boundary. I do not know what a "rock sharp" would call it, but under the glass it showed itself to be made up of small crystals of selenite (satin spar) and some sort of clayey material. At least it had the characteristic earthy smell when moistened. The rock is so soft it may be broken with the fingers. Ground and calcined in the laboratory it makes a very hard plaster, dark at first but whitening on exposure. It is reported that the deposit contains several million tons and that a strong company has recently acquired it.

First Steel-Gypsum Building on West Coast

The first steel-gypsum building to be erected on the West Coast is now being built at Bellingham, Wash., by Mr. Perkins of the Standard company. It is to be occupied by the American Can Co. and is 150x155 ft. on the ground floor and six stories high. The steel frame will be fire-proofed with gypsum, the roof will be gypsum and the floors gypsum. The outside walls, however, will be covered with terra cotta tile. Hence it is not an all-gypsum building, as



The big storage shed which will receive cargos of gypsum rock from Mexico

will be the 20 small houses which Mr. Perkins is preparing to build shortly; these will have poured gypsum walls, gypsum block partitions, and they will be plastered with gypsum inside and stuccoed with a new gypsum weather proof material on the outside. This gypsum stucco has been developed quite recently, but has been sufficiently tested, according to Mr. Perkins, to assure him of its weather-proof qualities.

As regards the economy of these structures, it is calculated that about 15% less weight of steel will be used, owing to the lesser weight to be supported in the gypsum floors and roofs. The small houses would cost $7500 each built of ordinary materials, but it is estimated that they will cost $4500 built of gypsum.

Gypsum Experiments as a Cure for Tuberculosis

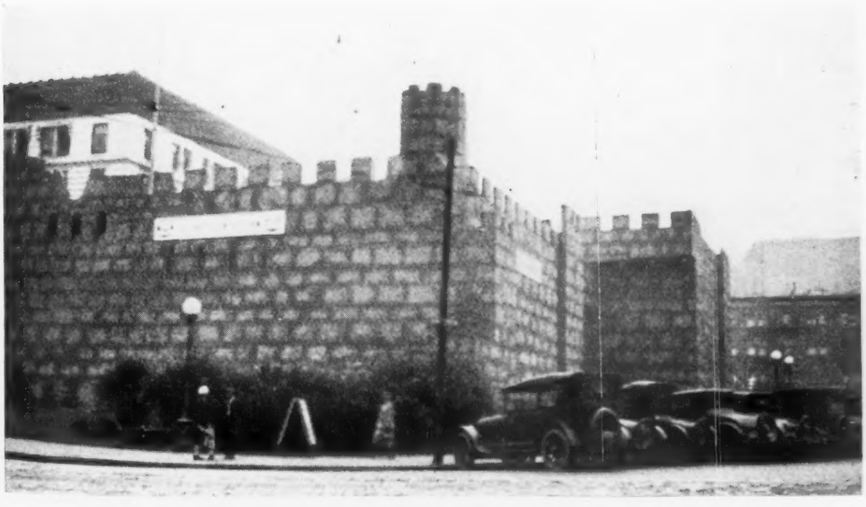
Mr. Perkins has been interested in gypsum manufacture and research work for 25 years and believes that we have not yet begun to realize its possibilities. He read Rock Products' articles on the cure and prevention of tuberculosis by gypsum dust and made an independent investigation in which he wrote over 150 letters, which showed that gypsum dust had a remarkably curative effect on diseases of the respiratory tract. He told me that while the flu epidemic was raging in the part of Alaska where the Pacific company's mines were located, there was not a case among the men who worked in the mine and crushing plant. He has recently found places for men with incipient "T.B." where they would work in gypsum dust and one case which has been under observation for 90 days has shown marked improvement, the daily run of temperature disappearing and the patient gaining in weight.

He also believes that gypsum will have a great use in making some sorts of sanitary ware and has backed his belief by having wash tubs made of it to be placed in the houses spoken of. From another source I have learned that an attempt to make sanitary ware of gypsum was at one time tried out in Tacoma, and while the enterprise was a failure it was said that lack of capital rather than the product was at fault. This report has not been confirmed, but the recent developments in gypsum products, both in this country and abroad, render one less skeptical of the possibilities of making almost anything of gypsum than he would have been a short time ago.

Large Export Business

The wall-board business in Seattle is of especial interest because so much of the board is made for export. The standard board made there is ¼ in. in thickness instead of the usual ⅜ in., and this is a considerable advantage in export business. About a third of the production of the Western Wallboard Co. goes abroad, the importing countries being Japan, China, Australia and most of the South American countries. Manila and Hawaii take a lot of it. It has more applications than one would imagine. For example, a shipment of 2,000,000 ft. was made to Dunedin, N. Z., early this year, all of which was used in an exposition for ornamental structures of a temporary sort. But of course the larger part by far of that which is exported goes into permanent structures.

This use of wall-board for temporary structures is common everywhere, but perhaps most common on the West Coast, where the movies have popularized it. The movies are almost built on a wall-board basis. As this is written there is an interesting example in Seattle, a reproduction of a Norman castle, originally put up as a part of the decorations of the city during a Knight Templar conclave. It served so well that it has since found other uses and



A gypsum wall-board "castle" sufficiently permanent to be used as an exhibition building in Seattle

houses at present a display of fire-fighting apparatus. Of course wall-board is not recommended for exterior work, but it is a little surprising to find out how long it will resist the effects of the weather when it is kept painted. The upper part of the Western Wallboard factory is housed with it and it has stood six years of exposure without deterioration.

The president and principal owner of the Western Wallboard Co. is Geo. A. Herzberg, who has been making wall-board and plaster-board for some 20 years. He has experimented with various types of machines and the machine that he has finally developed is that used in the factory today. It is simple, but it can make 200,000 ft. of board per day with a low power and labor cost.

The method uses a slow-setting plaster, retarded to 90 min. before setting begins. Hence there is no setting while the board is being made. The plaster is mixed in ordinary Blystone concrete mixers and fed to a belt carrying a sheet of special paper. The plaster is covered with another sheet brought in from a roll above and then it is passed through a single set of squeeze rolls. An ingenious cutting-off saw cuts it to the right length and the green boards are piled on a truck and allowed to stand for at least three hours, in which time the setting is complete. The boards are then run through a dryer of simple design and are ready for the market.

The finished wall-board is ¾ in. wider after the plaster has set and the paper stretched from the absorption of moisture. It is Mr. Herzberg's opinion that the slow setting and absorption of moisture is necessary to bring out the full strength of the set plaster and avoid the breaking of crystals already formed. It is on that basis that he has built his machine. Another interesting thing about the manufacture of boards in this plant is that the "mix" of gypsum and "aggregate" has been studied in the light of the researches of Professor Abrams and others on the design of concrete mixtures, and Mr. Herzberg has found that mixtures of gypsum and aggregate have many similarities to those of portland cement and aggregate, that is as regards the water ratio and the fineness modulus of the aggregate.

Federal Roads

THE issue will be raised at the coming meeting of Congress, shall federal aid for roads be continued? There is some sentiment in East that the far Western states are getting all the benefit of federal aid.

We are sure that men as intimately in touch with road work as our readers do not share this feeling. Public roads anywhere in this country are so large a factor in making for our public welfare that there should be no let-up in federal aid, even though on the face of it, most of the money, through taxation, appears to come from the Eastern and thickly settled part of our country.

As Secretary Barrows, of the National Sand and Gravel Association, has ably pointed out in a recent *Bulletin* of the association, the fact that the income taxes of corporations like the Union Pacific railroad are paid in New York City does not alter the fact that the profits of these great corporations are contributed by great sections of the West, which are justly entitled to have some of it returned in the form of federal-aid road money.

One of the diagrams herewith illustrates the very small part of our national budget that goes into road-building—perhaps the one expenditure of our government which does the most good and has the most lasting benefits. The other is a map of roads chosen by a committee of state highway officials as a system of national highways.

THE FEDERAL EXPENDITURE DOLLAR
SHOWING THE DIVISION OF THE FEDERAL EXPENDITURE FOR THE FISCAL YEAR 1924 AS REPORTED BY THE BUDGET BUREAU

Map of system of national highways to be uniformly marked throughout the country

Theory and Practice of Lime Manufacture*

Part VIII—General Inefficiency of Lime Manufacture—Conclusions

By Victor J. Azbe
Consulting Engineer, St. Louis, Mo.

THERE is no doubt that lime kilns as a rule are very inefficient, especially so the externally fired kilns which are usually used and to which this paper mainly refers. Thermal fuel efficiency of kilns as low as 25% is common, efficiency as high as 45 to 50% is scarce. While efficiency higher than this is possible, it is seldom obtained, primarily due to the lack of information on lime kiln design, on basic underlying chemical and physical principles of lime kiln operation and due to the lack of dependable standards for comparison.

Not only fuel efficiency is poor as a rule, but kiln capacity is low, labor high and often the lime appearance and quality are injured by improper burning. All this is realized by many lime men and they want to improve, but they are lacking practical, dependable information on proper kiln design and operation. Even theoretical information dealing with the laws of lime kiln performance is rather meager.

A prominent chemist of one of the largest lime companies in this country stated that lime industry is where the steel industry was 50 years ago. As far as lime kilns themselves are concerned, I think it would be safe to go much further back, since some of the very antique kilns of hundreds of years ago compare quite favorably with some of the kilns used today; and as to the science of lime burning, they certainly could not have employed less of it than is employed today by many.

The aim of this paper is to try to establish a standard of comparison and to outline on what these standards are based. Much of the information has to be technical, some of it will be hard to digest, some will even be in part incorrect and will have to be improved when more and better information becomes available. The discussion will center around higher fuel efficiency, higher kiln capacity, longer kiln running periods and better lime. Some of the subjects will be covered more fully than others but none will be covered as fully as they deserve, either because space, time or knowledge available does not permit.

Actual Fuel-Lime Ratios Obtained in Various Plants

It is often dangerous to generalize but I will take the chance and make the statement that a lime man should strive for a fuel cost of one dollar per ton of lime. This should be his aim regardless of what the purchased fuel cost is, since if the fuel cost is high, his plant should be more carefully designed and operated so as to get a better ratio than the plant obtains where fuel is cheap. There really should be a slogan "Fuel cost $1.00 per ton of lime"; and leaving out extremes of conditions this cost should be possible in most cases. In some other cases, it can be made nearly possible and in some it can be bettered. I will admit, however, that to attain this aim is quite difficult in many cases, especially so when the plant is improperly designed, but then while worth-while aims should be possible they may be difficult to obtain.

But what are the actual ratios, efficiencies and fuel costs obtained in different plants? To satisfy this query, I am giving in the following paragraphs results of a few good and a few poor plants.

Case "A"—A plant that the writer knows of, has high calcium stone, uses 12,000 B.t.u., $5.00 per ton bituminous screened coal. The results were as follows:

Kiln coal only=Ratio 2.33 to 1, Thermal kiln efficiency 26.8%; fuel cost per ton of lime $2.15.

Kiln and steam coal=Ratio 1.93 to 1; fuel cost per ton of lime $2.59.

Case "B"—At this plant, a good screened coal of 12,000 B.t.u. was burned, the coal costing $4.00 per ton delivered. The following results of two succeeding years include coal for kiln steam and for compressed air and hoisting equipment.

Ratio=2.12 to 1; fuel cost per ton of lime $1.88.

Ratio=1.76 to 1; fuel cost per ton of lime $2.27.

Case "C"—This is the same plant as Case "B" but under a different management, the same coal was burned and the same kiln and firing equipment used. The comparison is given to show how much difference there may be in quality of management.

Ratio=3.3 to 1; fuel cost per ton of lime $1.21.

Case "D"—Represents the combined results of a number of plants owned by a company. No steam was used, coal was run of mine of about 13,000 B.t.u. and its cost was $4.45 per ton. Lime was high calcium variety.

Ratio=2.65 to 1, kiln thermal efficiency 28%; fuel cost per ton of lime $1.68.

Case "E"—In this case, coal was cheap, costing $3.75 per ton of 11,000 B.t.u. screened bituminous. Vertical kilns were used with high calcium limestone. There was some coal used under the boiler but all steam was used for kilns so the coal must all be charged to lime.

Ratio=2.04 to 1, kiln efficiency 25.5%; cost of fuel per ton of lime $1.84.

Case "F"—In this plant, a large modern rotary lime kiln was used. The coal was of high quality having 13,894 B.t.u. per pound. Its cost was only $3.75 per ton. A modern gas producer was employed to gasify the coal. The ratio includes coal for gas producer boiler but no steam was used for any other purpose.

Ratio=2.23, kiln efficiency 22.1%; fuel cost per ton of lime $1.68.

Nearly Three-Fourths of Heat Wasted

In five of the above six cases, it will be noted that ratios are closer to 2-1 than 3-1. Fuel efficiency is around 25%; and 75% of heat is lost or wasted in some way or another. Fuel costs are closer to $2.00 than $1.00 per ton of lime and in addition to low fuel efficiency the output per kiln is low and the labor costs per ton of lime high. I think the above five are representative of the majority of lime plants in this country.

Some Fairly Efficient Plants

There are also plants that are relatively efficient as lime kilns go. These plants though are in a minority.

Case "G"—Illinois bituminous 12,000 B.t.u. coal is used, screened, $4 per ton, vertical lime kilns, burning high calcium limestone.

Ratio=3.75 to 1, thermal kiln efficiency 43%; cost of fuel per ton of lime $1.07.

Case "H"—Illinois bituminous 11,400 B.t.u. coal, screenings at $3.65 per ton, high calcium limestone.

Ratio=3.75 to 1, thermal kiln efficiency 45%; cost of fuel per ton of lime $0.97.

Case "I"—Indiana bituminous 11,750 B.t.u. small size, screened, costing $3.75 per ton, high calcium limestone.

Ratio=4 to 1, kiln thermal efficiency 47%; fuel cost per ton of lime $0.94.

The above three cases, "G," "H" and "I" are much better than the first five. The ratios are not as high as ratios are talked about, but are much higher than are usually obtained. Kiln thermal efficiency is still apparently low, but comparatively high. A lime kiln by nature is inefficient and it is difficult to raise efficiency as high as 50%, especially since in the past, relatively little study was devoted to lime kilns and so from

*Based on a paper read before the 1925 convention of the National Lime Association.

thermal standpoint they are not well understood. The main points of interest in the three specified cases are however, the fuel cost of around $1.00 per ton.

Closure

Fig. 18 gives the relative heights of 14 different lime kilns used in this country. The heights from the base of the firing zone up, range from 20 to 58 ft. This chart is shown not to argue high or low kilns, but rather to illustrate the state of inconsistency of lime manufacturing today. Most of the design is empirical and has to be so because data is unavailable to build kilns upon a scientific basis. Is there any one who could state with scientific accuracy,

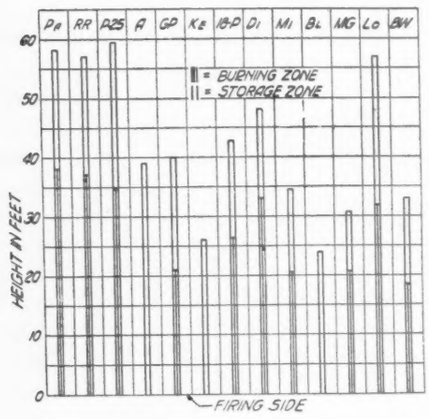


Fig. 18. Relative heights of various lime kilns

what is the proper height of a kiln or shape of kiln shaft for a certain definite capacity and height efficiency? There are no doubt some who think they know, but of the deciding factors there are so many which are so imperfectly understood, that I am sure that anyone who thinks he knows must be mistaken. The really efficient kiln has not been built yet. It is still in the process of evolution, and it will be so for many years to come; some are building kilns that are only approaching the goal.

Peculiarities of Lime Kilns

The number of peculiarities of lime kilns that lack definite explanation is surprisingly great. A man who had experience with only one or two different types of kilns does not realize this as much as the man who had experience with many different types, almost everyone having different characteristics. It is collective information gathered from the study of many different kilns over long periods that will eventually make possible the definite formulation of kiln design and kiln operation. When that time comes *Kiln Thermal Efficiency* will be 60% or better. A ton of lime will be obtained out of every 100 cu. ft. of effective kiln space, kiln life will extend into long periods, possibly years, kiln labor costs will be low and lime will be good, neither contaminated with impurities from the coal nor over-burned.

The Determination of Calcium and Magnesium Hydroxides in Hydrated Lime

TROUBLE with lime plaster is comparatively rare, but when it does occur, one of the factors to which it is sometimes attributed is the slow hydration of the magnesium oxide content of the hydrated lime employed.

It is well know that magnesium oxide, after heating to the temperatures existing in the average limekiln, hydrates, or combines with water, only with extreme slowness. This combination may easily take place after the lime has been used in a mortar or plaster and after an appreciable interval of time. Since the hydration is accompanied by a considerable expansion, more or less serious results may be expected if it does occur.

In order to study this problem more fully, the U. S. Bureau of Standards found it necessary to develop a method of analysis which would give some information not obtainable by ordinary chemical analysis, namely, the condition of the magnesium and calcium oxide content of the lime individually. The usual chemical analysis gives the total amount of combined water, for example, but does not give any information as to whether it occurs as calcium or as magnesium hydroxide. However, if the troubles which have sometimes been experienced are to be definitely attributed to the magnesium oxide, more must be known on this point. A method, which it is believed may be employed, and which was recently developed at the bureau, consists in heating a sample of the hydrate or mortar in a closed system, at definite increments of temperature, for periods of 20 minutes. The loss in weight of the sample is determined after each heating period. Since magnesium hydroxide loses its water at a lower temperature than does calcium hydroxide, if these data are plotted in the form of a curve (temperature against loss in weight) the amount of water present in magnesium hydroxide and that as calcium hydroxide can readily be estimated.

Several runs have been made using this method on samples of commercial limes high in magnesium. In every case investigated the calcium is almost completely combined, either as hydroxide or as carbonate. In hydrates newly received from the manufacturer the percentage of magnesium hydroxide seems to be very small, usually not more than 15 or 20% of the total magnesia content. In those samples which remained for some time in the laboratory, however, the percentage was considerably greater, showing that in time the magnesia does hydrate.

Thus far only hydrates have been studied. In order definitely to relate the magnesia content of a lime to its effect on the mortar or plaster more work must be done, since many of the hydrates studied, while having very low contents of magnesium hydroxide, have been used satisfactorily in practice.—*Technical News Bulletin*, U. S. Bureau of Standards.

Table for Computing Quantities of Cement and Aggregate for One Cubic Yard of Concrete

By E. EARL GLASS
General Manager, Pacific Coast Sand and Gravel Association, Los Angeles, Calif.

I AM enclosing copy of an article on quantities of concrete materials for various mixes which I devised some years ago. There is considerable discussion at present as to factors for converting cubic yards to tons of aggregates, and vice versa, especially since the rock producers are adopting "Honest Weight" as a uniform practice.

The ton measurement, which we all know is the only accurate measurement for sand, rock, and gravel is here to stay, so I believe your readers will be interested in this simple method for estimating the quantities required by either the weight or volumetric method.

The accompanying table is an extension of Fuller's Rule. The quantity, x, or the number of barrels of cement as computed from the table, will be found to check within 0.01 bbl. of the figures given in Taylor & Thompson's tables.

Let c = parts of cement.
s = parts of sand.
r = parts of rock or gravel.
S = sum of parts $= c + s + r$; as 1:2:4 mix, $S = 7$.
C, t, and y are constants taken from table below.
Ts = tons of sand per cu. yd. of concrete.
Tr = tons of rock per cu. yd. of concrete.
Ys = cu. yd. of sand per cu. yd. of concrete.
Yr = cu. yd. of rock per cu. yd. of concrete.
X = bbl. of cement per cu. yd. of concrete.

$$\text{Then } X = \frac{C}{S}$$

$Ts = Xts$ $\qquad$ $Ys = Xys$
$Tr = Xtr$ $\qquad$ $Yr = Xyr$

VALUES OF C

Proportion of voids in broken stone or gravel	Volume of barrel of cement assumed 3.5 cu. ft.	3.8 cu. ft.	4.0 cu. ft.
50%	12.1	11.4	11.0
45%	11.8	11.1	10.6
40%	11.2	10.5	10.1
30%	10.4	9.74	9.30
20%	9.65	9.02	8.6
t	0.175	0.19	0.20
y	0.13	0.14	0.15

The value of t is based on an assumed weight of sand, rock, gravel of 100 lb. per cu. ft.

Example

Example: Given a 1:2½:5½ mix, 40% voids in the rock, and 3.8 cu. ft. per bbl. of cement.

$1:2\frac{1}{2}:5\frac{1}{2} = 9 = S$
$C = 10.5$
$\frac{10.5}{9} = 1.17$ bbl. cement per cu. yd. concrete.
$1.17 \times 0.19 \times 2\frac{1}{2} = 0.555$ tons of sand, or
$1.17 \times 0.14 \times 2\frac{1}{2} = 0.41$ cu. yd. of sand.
$1.17 \times 0.19 \times 5\frac{1}{2} = 1.22$ tons of rock, or
$1.17 \times 0.14 \times 5\frac{1}{2} = 0.91$ cu. yd. of rock.

Quarry Men Hold First Meeting at National Safety Council

Blasting and the Use of Explosives—U. S. Gypsum Company's Quarry Experience

ACCIDENT prevention in quarries received real impetus at the September 30 and October 1 meetings of the newly organized Quarry Section of the National Safety Council, at Cleveland, Ohio. (The cement-mill section meeting of the council was reported in ROCK PRODUCTS, October 3, pp. 86 and 87.)

The high spot of the September 30 meeting was a paper by F. F. McLaughlin. Mr. McLaughlin has charge of all blasting operations for the France Stone Co., Toledo. Some of the points he made are these:

Blasting Can Never Be "Safe"

"Blasting is usually viewed as a necessary evil in the operation of a quarry—the War Department of the Industry, as it were. And often, as Sherman has said about war, there is some Hell connected with it. Every year a large number of blasting accidents occur, resulting in injury and death to many men. Because the accidents usually destroy the evidence, the actual causes of many blasting accidents are never fully determined, but with few exceptions a check on the previous conditions, plus the results of an accident, will prove that men, and not the explosives, primarily were the cause of the disaster. If this statement is true, our hope of preventing blasting accidents is well founded. A man can be trained—a case of explosive cannot direct itself.

"There is no such thing as a 'safe' high explosive. We buy it and use it for what it is—an enormous potential energy chemically stored and harnessed for our service. We may as sensibly expect to avoid the natural results of contact with a high tension power line as to abort the known laws governing explosives and get away with a whole skin.

"In face of all the death and injury incident to the use of explosives, it is folly to expect to find some easy road of escape from the hazard. But blasting accidents are preventable. They are caused by ignorance, carelessness, and by that miscellaneous item called 'The Act of God.' I put ignorance at the head of the list, and the densest comparative ignorance lies with the executive who hasn't sense enough to be afraid for himself and his men when he isn't sure of the right thing to do in blasting practice. Not many average working men are intentionally careless with explosives. They are afraid of it, and usually seek to get a blast made and over with as quickly as possible. Their ignorance which created their fear and haste produces a treble possibility for trouble.

Perhaps from several sources of information, you as well as myself, have been advised to do blasting as quickly as possible. Haste is never a good tool for a normal job, and blasting can be made a normal part of your quarry operation. Therefore, neither haste nor ignorance have any place in safe, efficient use of explosives.

E. E. Evans, chairman, quarry section, National Safety Council

No Excuse for Lack of Knowledge

"High explosives will normally follow and be governed by fairly well known laws. It is an inanimate material and can be controlled. Let us then really educate ourselves about this material and its use that we may avoid accidents and forget our fear of its use and power.

"Our government, through the Bureau of Mines, our states, through their various industrial commissions, the various explosives manufacturers, and our trade magazines will lay before us for the asking, the work of literally hundreds of men who have labored on this subject for our benefit. The purchase price of safety for you and your men is only ordinarily a letter stating your wants and some common sense to interpret in your particular quarry what you will be told about explosives.

"Every honest manager or superintendent wants to do the right thing. We err through lack of information. It is the intention of this paper to tell you the right and safe way to transfer the effort in a car of explosives from the car to blasted rock. It may sound to you as only the oft-repeated long list of 'do's' and 'don'ts', but remember when you are seeking ease in the use of explosives you are usually seeking trouble. The long, safe way is the shortest good road between the two points involved.

Have a Good Road to the Quarry

"Take some thought about the hazards of fire and collision when locating the car for unloading, and about the course your wagon, truck, or men must take in transferring the cases from the car to the magazine. If it was wise for the manufacturer and our government to be concerned about these details it is foolish for us not to follow their example. Have a good road from the car to the magazine and from the magazine to the quarry face. Why are so many of our quarry roads comparable to the old saw about the shoemaker and his own shoes, or the carpenter and his own house? We have the men and material needed right at hand with which to build the best roads in the country. Not only is a good road an attraction to a visitor at your plant, not only does it reflect our own pride and neatness around the job, but it pays a real dividend, especially in bad weather. It is safe to transport cased explosives in a clean wagon or truck on a good road. Cases of explosives need not be handled like an electric bulb, neither handle them like a keg of track bolts. Remember that you cannot know the exact condition of the contents of a case of explosives until the case is opened. Electric exploders and blasting caps should be handled like a crate of eggs, while powder fuse and cordeau will stand rougher treatment. As a rule, don't jolt or jar explosives any more than absolutely necessary. Never toss or throw them and be careful about the surface on which you slide them.

"The chemicals of many explosives de-

teriorate with age, and this tends to make them more and more insensitive to ordinary methods of detonation. This in turn leads to misfires in the blast. As far as possible, keep your explosives stock fresh—not over six months old. The government regulations applying to the packing of explosives require the manufacturer to rightly mark the boxes 'This Side Up.' They do not so mark the boxes in order to play a joke on you. 'This Side Up' means up, not down, nor on the side or end. Store them in the magazine as instructed.

"Don't—double don't—use frozen or hardened explosives. And don't thaw it either. Some will take exceptions to this word, but you don't know the chemical you are trying to bring out of a congealed state in the thawing process. It takes an explosive chemist to be safe during such an operation.

Get an Early Start

"If you were to make a bank blast today, yesterday was the right time to start it. By this is meant that intelligent preparation for a blast is, in itself a large factor of safety. Blasting cannot be rightly accomplished without preparation. Be sensible about blasting, not fearful. Be deliberate. Take time and forethought to plan the details of a blast even more thoroughly than you plan the other major details of your quarry operation. Clean the bore holes to be used, even if it means taking the drill to do it. Clean away the loose stone from around the top of the holes. Run the drill tools down to the bottom of each hole, knocking down any lodged stone or wood in the hole, and spudding up the cuttings that have settled to the bottom. Bail the holes thoroughly, removing all the water possible. Some kinds of explosives decrease in efficiency very rapidly under contact with water, and this fact is a prolific source of misfired charges. If you don't already know how, get some experienced explosive man to show you how to measure the width, space and depth that determines the tons burden of each bore hole. This information, plus your own experience in blasting your bank, will enable you to almost exactly determine the amount of explosive required for each separate hole, so that when delivering the explosive from the magazine to the bank you can place the amount needed adjacent to each bore hole. See that the top surface of the blast is clear of the odds and ends that gather from drilling and stripping operations. You can't blame your men for stumbling and falling if they are compelled to move around in the midst of a lot of debris.

"Clear the shot and adjacent surface of electric power lines that are near the surface, especially when electric blasting caps are to be used. Whenever possible clean away the face ahead of the shot before loading any holes. For a hole to explode from any cause with men working in front of the face of the shot means almost certain death to those men. See that all the tools are on hand, and in good shape, that are usually required in loading bore holes on your quarry bank. Use only wooden tools—wooden tamping poles without exposed metal, a wooden peg spliced on a rope for lowering cartridges in the hole, a round wooden peg 12 or 14 in. long for making hole in cartridges through which to lace detonators, a wooden mallet with which to open boxes, and a wooden box to hold detonators until used. Such preparation will go a long way toward inspiring confidence on the job.

"An old Chinese adage reads, 'He who rises late must trot all day.' It is wise to get an early start loading bore holes with explosives. It is cooler early in the morning, heads are usually clearer, and the explosives will not have to remain so long in the sun on a hot day. Above these reasons for an early start is the fact that you won't be so pressed for time in finishing the job. Don't hurry. You are spending quite a sum of money in explosives, drilling and labor. You must think as well as work. Take time to protect your investment, and you will be taking the safe, sane, sensible course. There ought to be one man on every shot to do nothing but watch the workmen. The material will do nothing of its own accord. It is eternally the men that get into trouble with the material. If possible do not have the process of loading more than one hole at a time. This concentration makes security and efficiency possible, while their value is divided by the number of holes being loaded at the same time. Do not have any more men working on the blast than absolutely necessary.

Don't Drop Charge Into Holes

"I am not prepared to say just how far various explosives can be safely dropped in a bore hole, but by past experiences I am prepared to say 'don't drop it at all.' It isn't necessary to drop it. Use a wooden peg hung on a rope, pushing the peg into the cartridge till friction holds it, and lower the cartridge with this tool down the bore hole. When the cartridge is seated where you want it a slight, sharp jerk will release the peg from the cartridge so that it can be drawn again to the top and the performance repeated until the hole is loaded. This loading practice does three things for you—it gets away from serious friction against explosive matter deposited on the walls of the bore hole as each succeeding cartridge is dropped; by means of measured knots or other marks on the length of the rope you can exactly determine where each cartridge is located; it avoids the possibility of jamming the cartridges in the hole and the consequent practice of dislodging the 'hung' cartridges. A jammed or hung cartridge is probably the greatest single ally of the undertaker encountered in the use of explosives. Even the use of a wooden pole is no insurance when you poke and push and hammer away at a hung cartridge trying to dislodge it and force it on down into the hole. Often the detonator is cut in the above process. It is better to lose the hole than to treat a cartridge roughly. It is still better to avoid paying both penalties by lowering the explosive instead of trying to drop it in the hole. Again, I confess, I am not prepared to say just how much tamping can be safely done on various explosives, but I am again prepared by experience, and in the interest of safety to say, do not tamp it at all.

Don't Tamp Explosives

"To tamp stemming in a bore hole is one thing, and quite all right if the detonator is not disturbed, but to tamp explosives is to again freely invite the pall-bearers and the preacher to your funeral. I know that some of you can tell me how many hundreds of times you have tamped explosive cartridges with a pole or bumper and 'got by with it,' but regardless of the supposed success of your past practice you are still wrong if you want to be safe. It is better to gain explosive efficiency by bringing the cartridge diameter and the diameter of the bore closer to each other—and then be satisfied with the result and with an uninjured body.

"Having the exact amount of explosives needed adjacent to each hole scatters the boxes over the shot where they are handy when needed as the loading progresses. This same scattering of the boxes divides the hazard of amount in one place to sparks, lightning, and misfires. Sometimes it is necessary to break cartridges to smaller pieces to load obstructed holes. Remember that as such a hole is loaded the hole walls become somewhat coated with adhering explosive. It is wise not to tamp even the stemming in such a hole. After the explosives are loaded in a hole throw in at once enough stemming to protect the exposed explosive from any fire. Look well to the kind of stemming or tamping used. In most quarries the finer size rock dust is used for this purpose. It serves very well, but keep the dust free from larger size rocks that might cut the fuse, wires, or cordeau while being tamped on the explosive charge.

Missed Holes

"We are all prone to give a sigh of relief when the last hole of a shot is loaded and tamped, and indeed quite a bit of our blasting hazard is over; but even though the details of your quarry operation press you hard for the stone in this blast take your time while connecting the detonators on the shot and make sure it is rightly done. Use only experienced men to 'hook up' the shot. Make a final inspection of all connections after the men, with their sometimes blundering feet, have been sent away. A poor connection of the detonators means a missed hole, and a missed hole not only means a poorer shot but passes the hazard to the shovel crew who have no good way to protect themselves. When you are finally ready to make the blast take the further step of assuring yourself that men and equipment are in the clear. See that they are even more than sufficiently safe for a blast will sometimes fool even the best 'guesser' on the job as to where it will land. Make sure, by

instructions and practice that your men, especially the new ones, recognize whatever type of blast warning signal you use.

"It goes almost without saying that you will take steps to protect nearby transportation highways and residents from possible flying stone from the blast. If you shoot with electricity do not connect the shot with the power line or battery until the main switch and fuses are pulled. In damp conditions, where there is a possibility of a ground through the switch block, go even so far as to disconnect the wires leading from the switch or battery to the shot until everything is ready to make the blast. It is a good practice to have a man stationed constantly by and in charge of the battery or firing switch from the time the detonators are being connected until the blast is made. If the shot is fired with a fuse and cap it is well to make a second, or 'dummy' fuse and cap 6 in. shorter than the main shot fuse. Light this 'dummy' first when lighting the shot fuse and on its exploding the cap you will know within 15 or 20 seconds when to expect the blast to go. If the powder fuse has been kept dry and is not kinked it will follow the manufacturers' rate of burning very closely, but no dependence should be put on a fuse in poor condition. In case of doubt about a fuse that has been lighted and does not explode the cap in reasonable time for its length, wait at least an hour before approaching it to discover the cause. Some very peculiar things have happened with poor fuse. Having successfully accomplished the loading and firing of a bank blast, do not be hasty in returning into the fumes and smoke that nearly always surround the blasted rock, especially wait in damp weather.

Secondary Shooting

"The same general sense applies to secondary or pop blasting as has been said about the bank blast. Have a couple of small storage magazines in the quarry handy to the work, one for explosives and one for detonators. Pick out a steady, reliable man for this work. After all is said and done, safety or hazard goes as the man goes. Beware of the fellow who carries explosives or caps around the shovel or locomotive in an open box, or who carries caps or explosives or both, in his pockets, or who crimps caps on fuse with his teeth or a knife, or who wants to save you money by using short length fuses, or who takes pride in the large number of fuses he can light at one time and get away with it. The practice of lighting a 'dummy' fuse shorter than any used in the small hole shots, lighted first and used as a warning signal to get under cover is a good way to avoid trouble with this part of blasting.

"In closing I offer this word to you men who are executives in quarry operations—none of these suggested safe practices about blasting, and the use of explosives, will cost you very much money. Compensation for the injured and killed calls for a good-sized check. An informed, reliable man is needed for supervision every time major blasting is done in a quarry if safety is to be a companion with your blasting. Let such a man have your confidence. Educate him constantly that he in turn may educate the men who must handle and use explosives in your quarry that they may come contented to work in the morning and go home safe and happy at night.

"'A laugh is worth a hundred groans in any market'."

Discussion of Mr. McLaughlin's Paper

N. S. Greenfelder, editor of the *Explosives Engineer,* complimented Mr. McLaughlin very highly for his contribution. He emphasized that blasting machines should never be used for parallel connections. He said the day of guesswork in blasting operations was gone, that tables had been prepared of the amount of explosives required for practically all conditions. He recommended the use of blasting caps made by the same manufacturer in the same circuit, since there are slight differences in the resistance of caps of different manufacture.

Mr. McLaughlin was asked how many more holes were required when the explosive was lowered into the hole instead of being tamped in, owing to the less efficiency of a charge loose in the hole. Mr. McLaughlin answered this by saying that he could not say unless he knew all the conditions; the loose cartridge, of course, would not give the same efficiency, but less efficiency was preferable to the hazard of dropping and tamping the charge into the hole; "You cannot have heaven and hell at the same time," he said. Splitting cartridges and dropping them into the holes is *not* a safe practice. Stemming should be put in as soon as the charge is placed, and no hole should be left until two or three feet of stemming has been placed. The stemming should eventually fill the hole.

Springing Holes

Spring blast holes is a practice to be avoided. When it is considered absolutely necessary to spring holes, these holes should never be shot until the next day. At the Pittsburgh Limestone Co. quarries, thermometers are used to find the temperatures of sprung holes before they are loaded. This company has made much progress in safety work by holding an "explosives school" once a month. It has been a splendid institution in developing the men in both safety and efficiency, as well as bringing them in closer and more friendly contact with their employers.

Sand was said to be the best material for stemming. Missed holes should always be exploded; never attempt to remove the charge.

U. S. Gypsum Co.'s Record at Genoa Lime Plant

J. R. Davis, superintendent of the Genoa (Ohio) quarry and lime plant of the U. S. Gypsum Co. made a valuable contribution to safety literature with a paper entitled, "How We Are Able to Operate with So Few Lost-Time Accidents." He said:

"Our plant at the present time employs about 275 men, of whom one-third are in the quarry. There is nothing exceptional about the plant or the type of men employed which was conducive to a reduction in accidents. On the other hand the conditions were perhaps unfavorable. The reduction, however, was made without any material changes in the organization or in the plant other than a natural growth in size. This point is mentioned here to show that conditions in our plant were no different from those in the average plant, and that such a reduction as has been made here can be made in practically any plant provided there is the desire and interest is aroused among the men.

"To go back for a moment to the year 1922. During that year the lost time due to accidents at the Genoa plant amounted to 64 minutes for each 100 hours worked. At that time there were approximately 200 men employed and our total lost time was equivalent to two men being off for the entire year. Unfortunately, we did not come to a realization of the seriousness of this problem at that time, and our record continued throughout the year 1923 at practically the same figure. In the meantime, statistics for all 25 plants in our company showed a reduction in lost time from 1922 to 1923 of 25%, having dropped from 53 minutes to 42 minutes per 100 hours worked.

All Since 1924

"The fact that the company as a whole had reduced lost time 25%, whereas we had made no reduction, aroused our fighting blood and early in 1924 we came to the determination that we, too, could make a reduction.

"A survey of the plant showed that our equipment was fairly well guarded but we started at work installing additional guards so that every possible danger point would be covered. We soon found, however, that this was not reducing our lost time. Accidents continued to happen and we came to the realization that a well guarded plant was only a very small step toward accomplishment of what we had in mind. A further survey of the plant showed that there were many places where serious hazards existed for which no guard could be provided except a careful workman. Wherever such a condition existed, a study was made and a set of safety rules drawn up to cover that particular point.

"As an example of this we have three gantry cranes hoisting rock from our quarry to the mill. These were notoriously hazardous machines and three fatal accidents had occurred here prior to this time. After a discussion with the crane operators, the hookers and others concerned, a set of rules was drawn up governing the craneman, the hookers and all others who came within range of these machines. These rules were not only posted, but a copy was furnished to each craneman and hookers and the reasons for the rules discussed with them.

"Another cause of frequent accidents was

stone rolling down the piles in the quarry resulting in broken legs for those who didn't get out of the way. Signs, warning of this danger were placed at several points in the quarry, the men's attention called to them and the reason for placing them there.

Educating the Men

"By studying such hazardous places and discussing them with the men, their interest was stimulated and they looked at safety in a new light. As one man expressed it, 'There may be something to this safety dope at that.' This procedure, however, brought only a comparatively few of the men in contact with the safety work, and in order to bring them all in, an intensive, educational campaign was started to interest all of the men, their families and the community at large in our war against accidents.

"We found a man in the plant who, in addition to being a clever artist, possessed imagination and with little effort he was interested in the campaign and started making home-made bulletins portraying possible sources of injury in our own plant and illustrating accidents that had occurred here. These bulletins aroused more interest than any we had ever used and drew attention to other bulletins in the new boards which had been placed throughout the plant. Large signboards were also made and erected about the plant, bearing safety slogans which were changed from time to time. One of these in particular drew so much comment among the men and from outsiders that it remains unchanged today. It is the one word, 'Think,' in large letters posted in a prominent location where all may see it when entering the plant. Another large bulletin board at the time clock house pictured a kind of race in which the contestants represented the various departments in the interdepartmental safety contest which was to run throughout the year. A "pennant" was made of sheet metal and painted, and was awarded each month to the department with the lowest lost time record.

Newspaper Advertising Helped

"Arrangements were made with the local newspaper for a display advertisement in the weekly issue, where an appeal was made to the men, their wives and children to join the safety movement. A column was also run in the news section dealing largely on safety and its benefits. Circular letters were mailed to the wives of the men in which they were urged to assist their husbands in cultivating safe habits. A little later an open air picture show was staged on the village park with a comedy for the little folks and safety films and talks for the grown-ups.

"To many of you these stunts are old but they were new in our plant and served their purpose in arousing the interest of the men in safety. We had a feeling that once that interest was aroused the men themselves would take the lead in safety work. Already there could be observed a new spirit. Records showed that accidents were becoming less frequent and less serious. By the latter part of 1924 the improvement was so great that from October 15 to the end of the year, there were no lost time accidents. The semi-annual, no-accident campaign staged by the company in all plants in October meant more to the men than ever before because they now saw its importance to them. At the same time, the inauguration of uniform safety committees and procedure gave the added impetus necessary to gain their full interest and co-operation. At the end of the year records showed that lost time had been reduced from 64 minutes per 100 hours in 1922 to 37 minutes per 100 hours in 1924, a total reduction of 42%. I might also mention here that the company records showed a reduction from 52 minutes in 1922 to 28 minutes in 1924, a total of 46%. We were still higher than the average but our reduction had been made in practically one year and under adverse conditions as during that year the plant had been increased in size about 50%, the construction work having been done by company men and the accident record included in our plant record.

Men Take Initiative

"By the beginning of 1925 the men had become so interested in the safety work that they were taking the initiative themselves in an endeavor to make the plant the safest of its kind in the country. I have mentioned before that they worked from October 15 to the end of the year without a lost time accident but they did not stop there. They continued to work without lost time accidents until April 20 of this year, a total of 189 days. Unfortunately, three accidents occurred within the next 20 days. However, once a group of men become interested in something and really want to put it across there is nothing can stop them. Beginning again on May 11 they have worked until the present time without lost time, a total of 142 days, and I hope they will continue until they have beaten their previous record, which is the goal they have set.

"To date this year there have been only four lost time accidents, all occurring within a period of 20 days. In fact these four accidents are the only ones that have occurred since October 15 of last year, whereas for the first 10 months of last year there were 35 lost time accidents. The lost time figure for the first eight months of this year amounts to only 7 minutes per 100 hours worked, as compared with 37 minutes in 1924, and 64 minutes in 1923, a total reduction of 89% in the past two years. For eight months this year company records for all plants show a lost time figure of 20 minutes per 100 hours, a reduction of 61% since 1922.

Particularly Proud of Quarry Record

"There is one more point which I would like to mention and that is the reduction in accidents made in our quarry this year. You are all familiar with quarry work and realize the natural hazards which exist in it, particularly when you have a large number of men breaking and loading stone by hand on piece work. In spite of this the men in the quarry have operated for nine months of this year with only one lost time accident and their lost time figure is only two minutes per 100 hours, as compared with 71 minutes per 100 hours last year, a reduction of 97%. While we have other departments which have a lower lost time figure, we have none that have made any reduction approaching this. We accordingly consider our quarry the banner department and an asset to our safety work, whereas we formerly considered it a heavy liability.

"While the reduction in accidents during this past year is due largely to the interest of the men, we have not decreased our propaganda but have perhaps increased it. Advertising safety is like advertising any other article. A desire can be created by an intensive campaign but unless you continue to advertise after that desire is created, the article will soon be forgotten. For this reason we have continued our propaganda using new signs, new bulletins and new ideas. The occasional group gatherings of the men have grown into regular monthly meetings at which talks on various phases of safety work are given by the men and others, and prizes awarded for the best suggestion submitted by an employe during the preceding month. The little metal pennant for the best department record has been replaced by a small silver loving cup. The newspaper propaganda has been continued and supplemented by a small monthly magazine, published under the name, 'Lime Light,' in which the last word stands for the light of safety which is guiding the men.

"In conclusion, let me say that the reason we have been able to operate with so few lost time accidents is because the men have grasped the real idea of safety and repeat again that when a group of men become interested in something and really want to put it across, nothing can stop them."

Quarry Transportation Hazards

W. W. Stewart, sales manager, Koppel Industrial Car and Equipment Co., had a paper on "Hazards of Standard and Narrow-Gauge Railroad Equipment,' in which the following points were developed:

"In the quarries we encounter extreme hazards as we are obliged to combat such elements as very poor track conditions with heavy grades and inclines; overloading of cars; improper loading of cars; excessive spotting of cars; handling of cars having high center of gravity necessary to insure proper dumping and the use of the link and pin couplers.

"In reference to track conditions, the standard gauge railroad equipment requires the use of heavy rails, and as the cars have double trucks they will ride very uneven tracks, whereas, the narrow-gauge equipment requires lighter rails and smaller cars with single-truck construction, considerable difficulty is experienced to keep cars on the track. To maintain perfect roadbed would require considerable expenditure, because

just as soon as the steam shovel has made one cut, it is necessary to move this track over to the face of the quarry. However, it is true that the high and low spots, loose joints, crooked rails, proper elevation on curves and widening of track gauge at the curves should be taken care of in the quarry, thereby reducing to a minimum possibility of derailments and wrecks.

Overloading Cars

"A very common practice in quarry work is the overloading of cars and loading of cars heavy on one side to facilitate dumping, both of which are detrimental to safety. The ideal quarry car to withstand heavy quarry service must have body construction to stand abuse occasioned by dropping of large rocks from the steam shovel dipper, and must have stability of frame required for handling cars in trains, yet sufficient flexibility to insure satisfactory operation on uneven tracks, and where side-dump cars are used the design requires a very high center of gravity to secure proper dumping angle. When such cars are in transit the unevenness of track causes considerable swaying of the cars, resulting in spilling of the load; subsequent derailment, and ultimately, loss of production to the manufacturer; property damage to tracks and cars and possible chance of injury to workmen.

Coupler Hazards

One of the greatest hazards of railway equipment in quarries is the use of the link and pin couplers. On standard-gauge equipment the automatic coupler is used almost universally. However, the larger equipment generally operates on heavy rails and large radius curves, whereas, the narrow-gauge equipment must operate on light rails and very small curves. The automatic coupler is limited to a certain exent in its ability to function properly and still take care of the vertical and lateral motion due to unevenness and curvature of track, but the link and pin coupler permits wide clearances and will function under very adverse conditions. However, the coupling of cars requires adjusting the link into proper position when cars come together, and this operation sometimes results in injury to workmen.

"Further, the coupler, in addition to being the means of coupling cars together is also part of the drawbar and is subject to severe shocks and strains. Also the hauling of cars on inclines with cable hooked into the coupler and 'spotting' of cars, requiring considerable jerking of trains, both work hardship on the couplers and draft gear.

"The general practice on draft gear with automatic couplers is to use a lipped yoke at the coupler. However, on small narrow-gauge cars a yoke cannot always be used, then the split-tail coupler is substituted. This split-tail coupler requires the use of a pin at the end of the coupler shank and this pin is not always accessible. Therefore, on cars with this type of coupler the draft gear should be subject to periodical inspection and frequent replacement of this particular pin.

Proper Lubrication of Cars

"Another small detail which if given proper attention will eliminate considerable hazard, is the oiling of the journal boxes. Most quarry men believe that the oil should be inside the journal box and this is correct but—why not put a little oil on the outside of the box where the box rubs the pedestals? This would insure free movement of the boxes in the pedestal guides when the springs are compressed and if proper clearance has been provided between the bottom of the box and the pedestal tie bar, the wheels will ride the high and low spots in the tracks reducing to a minimum the possibility of the flanges of the wheels climbing over the heads of the rails causing derailment and possible injury to workmen.

Loading Out Standard-Gauge Railway Cars

"When loading material from the bins into the railroad cars, it is customary to have the track elevated and on this elevated track the railroad company spots the empty cars. Occasionally an employe will drop an empty car down to the bins without first examining the brakes and this car will get away, crashing into another car that has been loaded, thereby causing a wreck, sometimes a derailment with loss of time and frequently an injury to an employe. It appears that proper instructions by the superintendent to the employe, to properly inspect this equipment would prevent such accidents.

There is another feature relative to the railroad company's equipment which is quite common. Considerable equipment is placed at the industry's loading track not properly cleaned out and it is necessary for the loader to have one of their employes clean these cars. To clean these cars it is necessary to drop the hopper, and a great many stone producers are using the old-style hopper wrench, and if they would use what is known as a safety hopper wrench a good many accidents could be prevented.

Motor-Truck Hazards

"At some quarries considerable stone is being moved by motor trucks and in many cases it is necessary for these trucks to drive under the bins where the railroad cars are loaded and where the dinky locomotive travels back and forth moving this railroad equipment. In these particular cases the operators should use extreme caution to prevent damage to the trucks or injury to the driver. Here is a case where a car being spotted for loading got away and crashed into a truck being loaded underneath the bins. In the truck driver's endeavor to get away he was pinned between the truck and the railroad car and killed. With a little more care this accident could have been prevented."

Ohio State Official on Safety

The state of Ohio is in the compensation insurance business; therefore a paper by T. P. Kearns, superintendent, division of safety and hygiene, department of industrial relations, of the state, was particularly interesting. He presented a strong plea for attendance at future meetings, pointing out that safety will actually pay in dollars if safety laws are strictly enforced, because of reductions to be had in insurance costs.

Laws alone cannot prevent accidents; employers must do *more* than merely comply with the safety laws; *the desire* must be in every operator's heart for if it isn't, safety and its meaning cannot be instilled in the hearts of workmen, *"If the spirit of safety is not there, no man can get far in promoting safety"*—"Don't let it become a routine, for then it becomes carelessness. Instead, be always on the alert for new systems and methods of promoting safety," were some of the statements made.

From the scant statistics available and from personal observations, the quarry and crushing plant accidents are in the following order:

1. Accidents at the quarry face.
2. Accidents from flying rock.
3. Accidents at stripping bank.
4. Accidents in handling explosives.
5. Accidents in the plant.

To Mr. Kearns, rock crushers, themselves, are a great hazard. Why not make it mandatory that crusher feeders wear life belts? A discussion of this was called for and several operators responded. Some stated that they have one of the following safety features:

1. Handrails about the rim of crushers.
2. Dangling ropes with knots which are within reach of a man who might have fallen into crusher.
3. Control switches nearby so that crusher can be stopped instantly.
4. Overhead cranes, eliminating the necessity of men getting into the crusher.

National Crushed Stone Association Promises Co-operation

Secretary A. P. Sandles of the National Crushed Stone Association, read a telegram from President Otho M. Graves expressing his deep regret that he was unable to be present at the meeting and assuring those present of the association's desire for close co-operation in accident prevention. He said that everyone can look forward to seeing Chairman Evans putting on a "safety show" at the next N. C. S. A. annual convention. Secretary Sandles made a very inspirational speech on safety-first work.

Officers Elected

E. E. Evans, of the Whitehouse Stone Co., Toledo, Ohio (Mr. Evans is president of the Ohio Macadam Association), was unanimously elected chairman of the quarry section of the National Safety Council for the ensuing year. D. C. Souder, insurance manager, of the France Stone Co., Toledo, was elected vice-chairman; J. L. Grider, of the U. S. Gypsum Co., Oakfield, N. Y., was elected secretary, and A. P. Sandles was elected chairman of the membership committee.

Tenth Exposition of Chemical Industries

Many Exhibits and Papers of Interest and Value to Rock Products Men

THE Exposition of Chemical Industries held in the Grand Central Palace, New York City, during the week of September 28 to October 3 was the tenth in a series of such exhibits which have been staged in this country to call the attention of the lay public to the everyday value of technical developments and to afford a place where producers and consumers of raw materials, finished products, and equipment for such industries can get together and learn of the important steps which mark the rapid advance in these particular activities from year to year. Modern industry operating at high pressures presents many new and serious problems which as yet have hardly been considered in this country. We are living in a period of change in which only the resourceful can hope to maintain themselves in the face of the new conditions and as stated by A. D. Little, an advanced figure in the field of application of technology to industry, "The price of progress is research, which assures the security of dividends." It was at this Chemical Show covering three entire floors of the Grand Central Palace that each new development, improvement and discovery—included in the fields of equipment, chemicals, chemical products, apparatus, instruments, technical processes and raw materials—were intelligently exhibited and explained and their uses outlined by experts. Every single booth displayed something interesting and instructive and the contacts developed by both exhibitors and visitors should serve as a stimulus for thought in new channels and to a development of greater value of the individual to the organization which he represented.

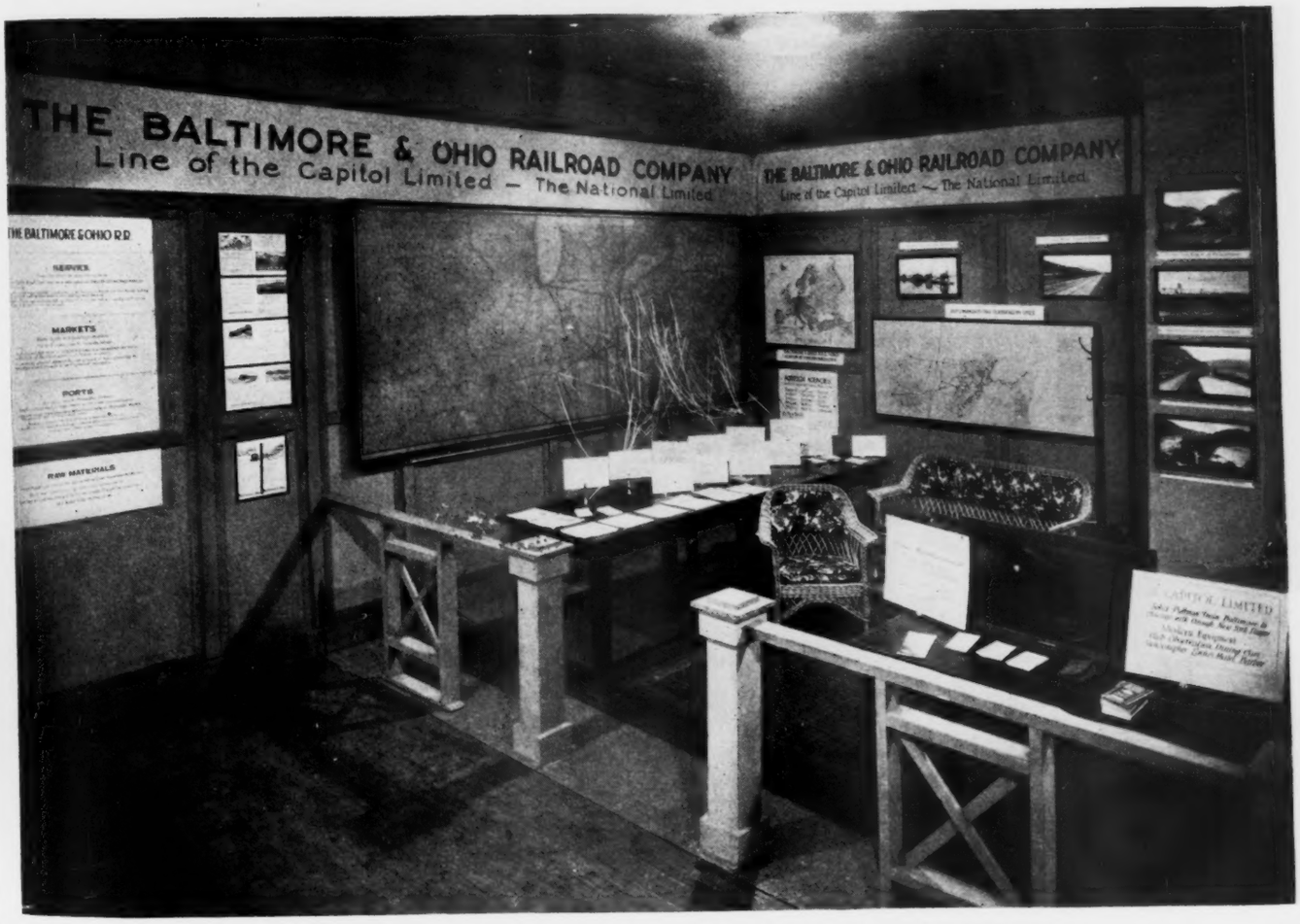
Not only is each year's exhibit a notable educational affair but it serves as the country's greatest industrial market place. In no other place and in no other way can the manufacturer gain in so short a time an accurate knowledge of the opportunities for increasing the outlets for his products. Nowhere else is such an opportunity offered for comparison of many materials, apparatus, and products or for meeting prospective customers including builders, contractors, architects, engineers and agriculturists as well as chemists and other technical men.

As indicative of the appeal of this exposition to representatives of rock products industries, it may be noted that the president of one of the far Southwestern lime companies considered it well worth while to attend the show every day during the whole week.

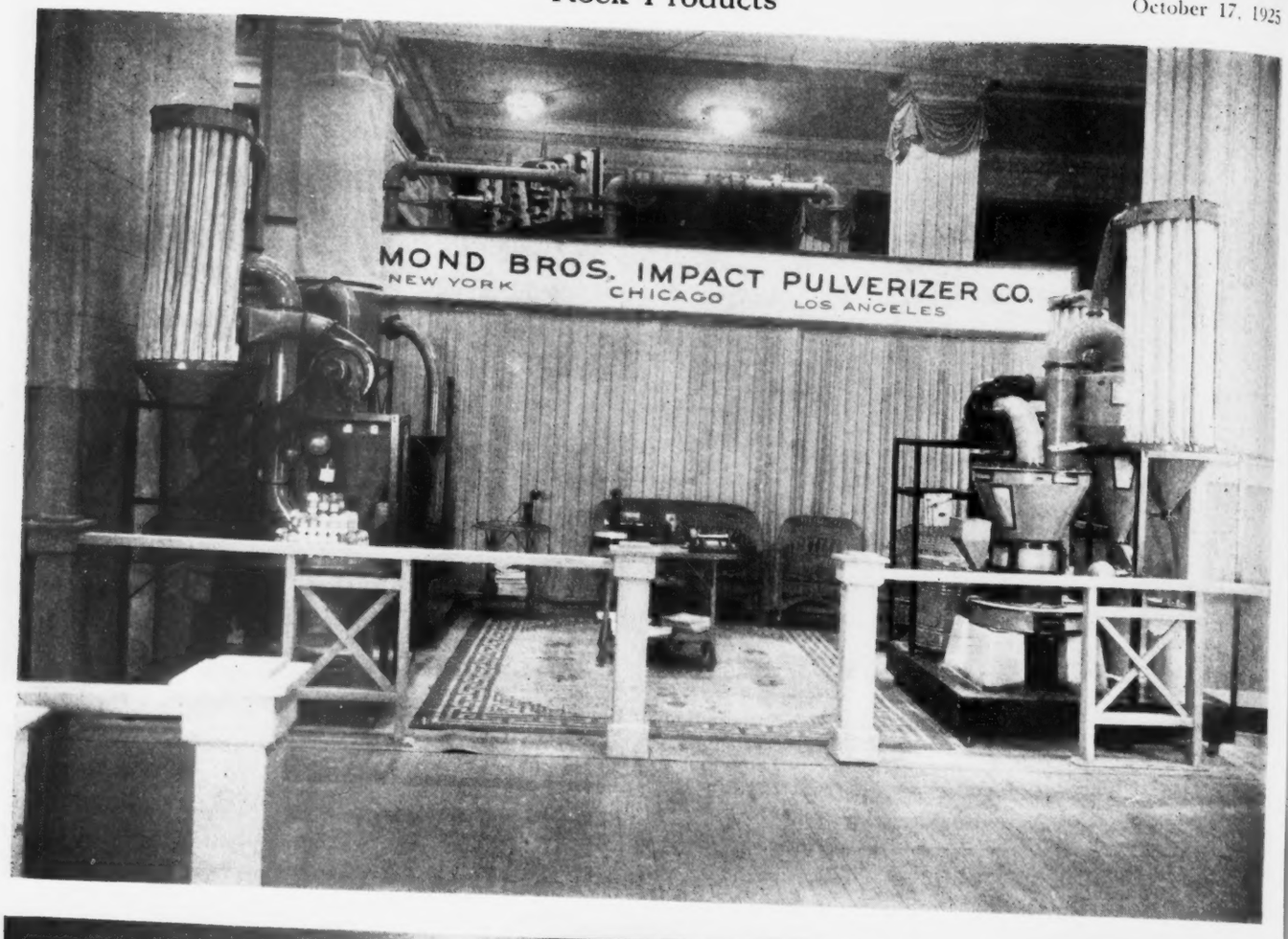
Association Exhibits

Two associations representing rock products industries exhibited. The National Slate Association at their booth demonstrated the practicability and value of slate for laboratory and plant equipment such as hoods, desk tops, electrical equipment, etc., and called attention to the possibilities for ground slate as a filler and decorative ma-

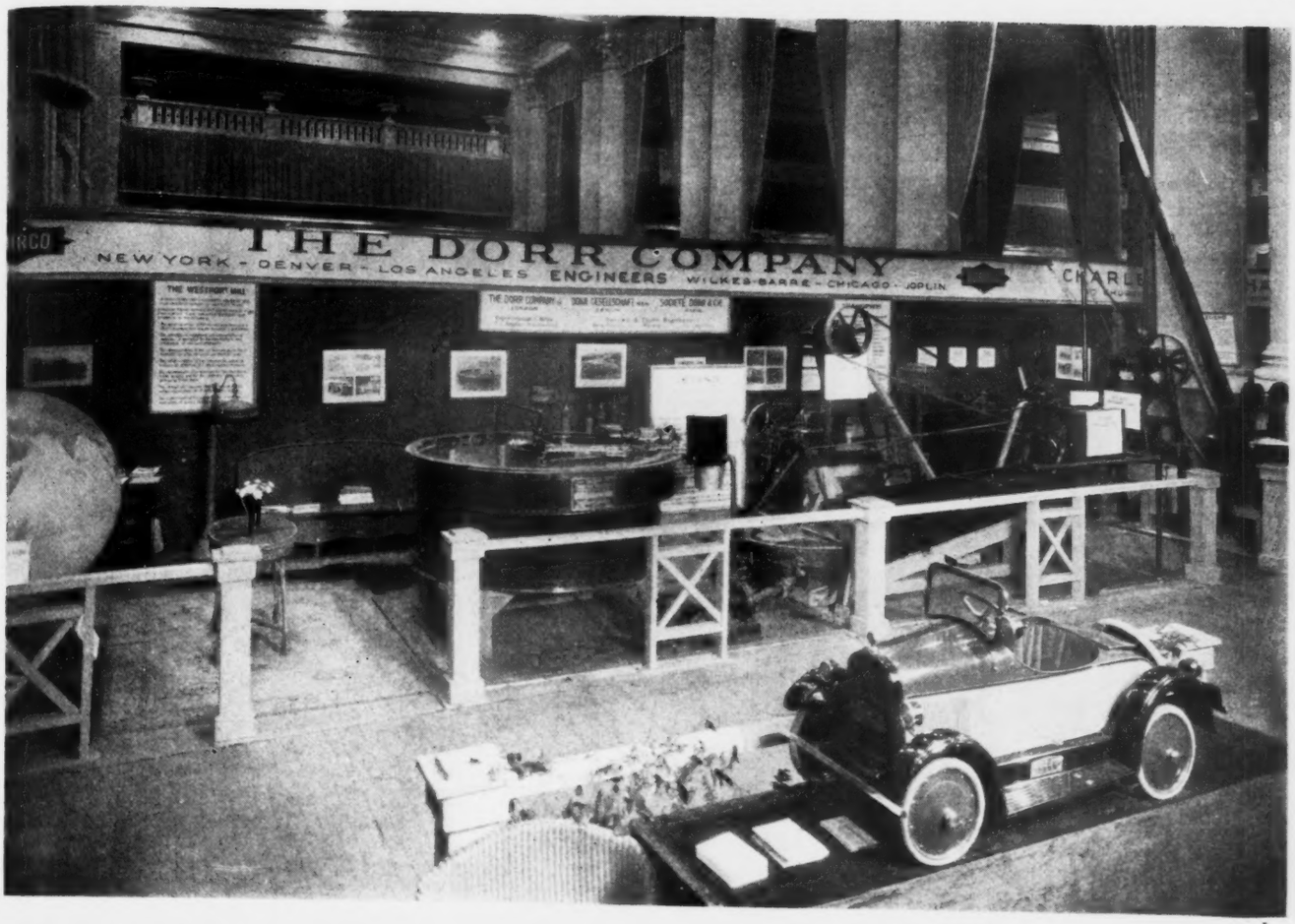
Booth of the National Lime Association—samples of lime and literature of value to chemists in all industries


THE BALTIMORE & OHIO RAILROAD COMPANY
Line of the Capitol Limited — The National Limited
THE BALTIMORE & OHIO RAILROAD COMPANY
Line of the Capitol Limited — The National Limited
THE BALTIMORE & OHIO R.R.
SERVICE
MARKETS
PORTS
RAW MATERIALS

Two railway company exhibits in which rock products had prominent places



Two machinery manufacturers exhibits of educational value to rock products producers



Two exhibits of educational value to cement and lime manufacturers

terial in a number of industries.

The booth of the National Lime Association, by an exhibit of a large number of products in the processes of manufarture of which lime is used, focused attention upon the versatility of this product both as a raw material and as a chemical reagent in approximately 115 different important industries. Charts were exhibited showing these uses and describing the work of the association in its educational and promotional work and large quantities of literature were distributed to a great number of interested visitors.

Ten lime manufacturers representing various sections in the entire country considered the exposition of sufficient interest to be represented by a total of 28 of their executives, superintendents and salesmen.

Exhibitors Representing Rock Products

The American Lime and Stone Co. and the Charles Warner Co. exhibited their numerous products and featured their pebble chemical lime. They demonstrated experimentally the extremely slow setting of milk of lime suspension made from this pebble lime, this being a property which gives their product distinct advantages in a number of industries such as tanning, insecticides, etc. This was the first exhibit of an individual lime manufacturer and we trust, now that the ice is broken, that a number of manufacturers will consider exhibiting extremely worth while.

The value and possibilities of talc and allied minerals was called attention to by the Southern Minerals Co. and the Eastern Magnesia and Talc Co. The mineral deposits of the South, in fact, came in for a great deal of attention. A most interesting exhibit of these resources was made by the Southern Railway system and by the Southern Pacific Co. The Baltimore and Ohio railroad indicated by a chart the location of the more important deposits of minerals in the sections served by this system and called attention to the wide possibilities and outlets for products from these deposits. The Seaboard Air Line also demonstrated the geological and chemical resources along its routes by showing both raw materials and intermediate and finished products produced in these regions. Especial attention was called by each of these carriers to the service rendered by their respective commercial development departments.

The various uses of sodium silicate (water glass) were stressed by the Philadelphia Quartz Co. These uses include the softening of water, the protective coating of pipes against corrosive liquids, the sealing, coating and impregnating of packages, etc. The Tamms Silica Co. exhibited their products and called attention to the various uses.

The exhibit of the Celite Products Co. attracted a great amount of attention. This company exhibited a flow sheet showing the wide uses for this product. These include insulation for lime and cement kilns, for chemical and thermochemical furnaces, the decolorization and refining of sugar syrups and fruit juices, the clarification of animal, vegetable and mineral oils, beverages, glues, gelatin, dye-stuffs and other chemicals as well as its use in toilet preparations, polishes, concrete, etc.

The interest of foreign manufacturers in outlets in American industry was clearly demonstrated by the excellent exhibit put on by the Ontario Department of Mines where the extensive natural resources of this province were presented in a very interesting fashion.

Equipment Exhibits

The exhibits of equipment manufacturers was one of the important features of the show. Every possible type and form of apparatus which might be of interest to rock products producers was on display. A model of a slow speed conical mill, a reversed current classifier, a super-thickener and clarifier, a rotar spray were displayed by the Hardinge Co. of York, Pa. The Abbey Engineering Co. showed various types of grinding mills and the Gruendler Patent Crusher and Pulverizer Co. featured jaw,

National Slate Association exhibited use of slate for chemical laboratory equipment

roll and hammer crushers, beater mills and cyclone separating systems.

Mixing equipment, clarifiers, thickeners and sludge conveyors were exhibited by the Dorr Co. The extensive use of these types of equipment in the mining, coal and rock products industries and in installations in chemical and water treatment plants involving the use of lime and other rock products was demonstrated in most cases by working models. Mills for crushing, grinding and shredding—including over 300 types—were described and the use of certain ones for crushing coal, limestone and glass, for pulverizing clays, shale, talc, etc., was demonstrated by the Williams Patent Crusher and Pulverizer Co. Other companies having interesting exhibits of machinery and equipment were the B. F. Sturtevant Co., the Dings Magnetic Separator Co., the Hydrotator Co., the Morse Chain Co., the Steacy-Schmidt Co. and the Premier Mill Corp. The latter company exhibited their colloid mill which suggests a large number of possible applications in the fine grinding of rock products and other minerals.

The Raymond Brothers Impact Pulverizer Co., as usual were on hand with a very interesting exhibit of pulverizing and separating systems which have a wide application in the rock products industries. Mr. Kanowitz has recently gone into the theories applicable to the production, separation and properties of fine particles and is applying the information obtained in the perfecting of the products of the Raymond Brothers Co.

The W. S. Tyler Co. and the Newark Wire Cloth Co. exhibited in a very interesting way the recent development in the line of sieves and screens as well as their standard and widely used equipment. The Bristol Co., the Brown Instrument Co. and the Uehling Instrument Co. showed temperature, pressure and carbon dioxide recorders which have important applications in practically all plants. The development of the technology and application of such measuring and recording devices has made rapid strides within the last few years and has had a marked influence on the correction of difficulties and the improvements of products in lime, gypsum, cement, dead-burned dolomite and numerous other industries. High temperature cement for lime, portland cement and ceramic kilns and furnace specialties were exhibited and demonstrated by a number of companies including the Quigley Furnace Specialties Co.

Fuel and Combustion

A number of exhibits contained equipment or information of interest in connection with the combustion of various types of fuels. Perhaps the outstanding feature was the exhibit by the C. M. Kemp Manufacturing Co. of burners for the complete combustion of gaseous fuels. The successful operation of burners by which gaseous fuel is burned in actual contact with water was demonstrated and it is evidently possible that on account of some of these revolutionary developments, our entire conception of evaporation and of steam and power generation may have to be revised. So revolutionary and apparently so impossible an idea as 100% utilization of the heating value of the fuel in a boiler has actually been accomplished by this means.

Outlets for Rock Products

Owing to the extensive applications of various rock products, practically every booth held something of interest suggesting either directly or indirectly an outlet for these materials.

Glass

Perhaps the outstanding exhibits in this connection were those of the Corning Glass Co. and of the Ford Motor Co. The possibilities for increased demands for glass sands, limestone, lime, salt cake, soda ash, etc., were very apparent at the Corning Glass booth where the wide extension of uses of Pyrex glass in equipment for chemical manufacturing plants was demonstrated in numerous ways. The transparency of this product coupled with its low thermal expansion has led to its extensive use for sight glasses for evaporators, reaction kettles, columns, pipe lines, oil refining "look boxes," etc. Its electrical insulating properties are also opening up other new fields.

Coal and Wood Distillation

The exhibit of the Ford Motor Co. is worthy of very special mention. Here were shown cross sections of the complete processes and plants for the distillation of coal and the distillation of wood, processes which are now in operation at Iron Mountain, Mich. The wood distillation process demonstrated is of particular interest because it makes use of the heat liberated by the ex-thermic decomposition of cellulose at carbonizing temperatures and also because it demonstrates the possibility for the economical retorting of finely divided wood, sawdust, chips and other similar waste cellulose materials. The outlets for lime, limestone and numerous other such products has been very materially increased by these processes and the by-products coming from them.

Stoneware and Glass Enamels, Etc.

Stoneware and glass enameled equipment were shown in a number of booths indicating the extended use of ceramic materials in practically all industries. The possibilities for the use of mineral products as fillers were pointed out in exhibits of hard rubber products, paint fillers, the phenol-resin products, etc.

Up-to-Date Uses

As proof of the fact that the technology of the use of rock products has been brought entirely up to date, it might be noted that the National Lime Association had inquiries from two permanent hair waving establishments for lime to be used in this process.

Court of Chemical Achievement

The Court of Chemical Achievement was the center of attraction for a majority of the technologists attending as well as for numbers of industrialists. Here were described or demonstrated a number of the outstanding achievements in American chemistry, both in the research and industrial field, which had been selected from a still greater number by a representative committee of the industries. These ranged from the extremes of the achievements in pure science, such as the separation of elements into isotopes, to development in the everyday field of manufacture such as explosives, nitrogen fertilizers, etc.

Motion Pictures

As part of the exposition program, films depicting the processes and operations in a number of industries were shown. In this connection those of most interest perhaps were: "The Path of Balls," which was shown by the courtesy of the Ontario Department of Mines; "The Quarrying and Shaping of Slate—Nature's Product of Manifold Uses," shown by the National Slate Association; "Gypsum Mining in Ontario," also by the Ontario Department of Mines, and "The Tight Barrel—from Tree to Finished Product," supplied by the Associated Cooperage Industries.

Students' Program

In addition to this a very instructive program for industrial engineering students was scheduled for each morning of the show. A large number of students from nearby educational institutions were in attendance and undoubtedly profited very materially not only by the courses offered but also by the direct contact with the demonstrated accomplishments of the various industries.

It would be impossible, of course, to recite all of the extremely interesting demonstrations, but the above outline should at least be of sufficient interest to create in a larger number of the representatives of the rock products industries a desire to attend the eleventh exposition which will be held during the week of September 26, 1927. As has been said, "The advances of civilization depend upon accumulated ability for accomplishment to no less a degree than upon brilliant inspiration," and we believe that the Tenth Chemical Exposition demonstrated not only the existence of the brilliant inspirations but also conclusively demonstrated American ability for accomplishment.

Lime Manufacturers Attending Chemical Exposition

Dittlinger Lime Co., New Braunfels, Texas—H. Dittlinger.

Charles Warner Co., Wilmington, Del.—Irving Warner, E. E. Eakins, E. B. Emory, Franklin S. Lee, George Purnell, D. E. Washburn, E. Kenworthy.

Rockland and Rockport Lime Corp., Rockland, Maine—G. B. Wood, E. B. Page.

Security Cement and Lime Co., Hagerstown, Md.—J. J. Porter, Loring Cover, Paul Bock.

New England Lime Co., Pittsfield, Mass.—R. H. Williams, R. O. Elcock, David Follett, Jr., J. King McLanahan, Jr.

G. and W. H. Corson, Plymouth Meeting, Penn.—Phil Corson, general manager.

Palmer Lime and Cement Co., New York—R. L. Bogart, T. C. Wood, A. E. White, J. Delaney, G. L. Connell, Dr. A. Zimmerman, F. G. Krumholz.

Marblehead Lime Co., Chicago, Ill.—R. S. Peotter.
Burton K. Harris, Saylesville, R. I.—Burton K. Harris, President.
New England Lime Co., Rockland, Mass.—T. Black.

Exhibits of Interest to Rock Products Industries

American Lime and Stone Co., Bellefonte, Penn.; The Bristol Co., Waterbury, Conn.; Brown Instrument Co., Philadelphia, Penn.; Celite Products Co., Los Angeles, Calif.; Dings Magnetic Separator Co., Milwaukee, Wis.; The Dorr Co., New York; Eastern Magnesia Talc Co., New York; Gruendler Patent Crusher and Pulverizer Co., St. Louis, Mo.; Hanovia Chemical and Manufacturing Co., Newark, N. J.; Hardinge Co., Inc., York, Penn.; Hendrick Manufacturing Co., Carbondale, Penn.; Hoyt Metal Co., St. Louis, Mo.; C. W. Hunt Co., Inc., West New Brighton, N. Y.; Hybinette Victor, Wilmington, Del.; Hydrotator Co., New York; Metro Nite Co., Milwaukee, Wis.; National Slate Association, Philadelphia, Penn.; New York Commercial, New York; New York State Department of Labor Industrial Hygiene Bureau, New York; Newark Wire Cloth Co., Newark, N. J.; Norton Co., Worcester, Mass.; Philadelphia Quartz Co., Philadelphia, Pa.; Raymond Bros. Impact Pulverizer Co., Chicago, Ill.; Ruggles-Coles Engineering Co., New York City; Sandvik Steel, Inc., New York City; Seaboard Air Line Railway, Dev. Department, Savannah, Ga.; Simpson, Orville Co., Inc., Cincinnati, Ohio; Southern Minerals Corp., Burlington, Vt.; Steacey-Schmidt Co., York, Pa.; Structural Slate Co., Pen Argyl, Penn.; B. F. Sturtevant Co., Hyde Park, Boston, Mass.; Tamms Silica Co., Chicago, Ill.; W. S. Tyler Co., Cleveland, Ohio; Williams Patent Crusher and Pulverizing Co., St. Louis, Mo.

The eleventh national exposition of the chemical industries will not be held for two years—in 1927. They are always held in New York City.

Sand Producers Have Interesting Exhibits at Foundrymen's Convention

Advantages of Attractive Showing of the Industry's Products Being More Widely Appreciated by Rock Products Operators

THERE were only eight foundry sand producers who exhibited at the annual convention of the American Foundrymen's Association, Inc., held in Syracuse, N. Y., October 5 to 9, but these producers did an excellent job of representing their industry. This was accomplished by exhibiting not only their own wares but products made through the use of them.

The Albany Sand and Supply Co., Albany, N. Y., had a booth in which were displayed samples of all grades of molding sand. The company was represented by Lawrence Murray, M. J. Slaten and David B. Baxter.

The Ayers Mineral Co., of Zanesville, Ohio, exhibited silica sands and silica wash for steel molding use, as well as milled, blended and screened molding sands for iron, brass and aluminum. This company was represented by E. M. Ayers, Russell G. Hay, J. A. Crew, George W. Jones, James S. Smith and D. B. Davies.

Charles Pettinos, New York City, required two booths for displaying their many products. These included molding and foundry sands, clays, cupola daubs, plumbago, graphite, facings, blackings, etc.—represented by Marshall Houskeeper, Walter J. Meighan, J. Howard Bing, W. T. Bennett and J. J. Grace.

George F. Pettinos, Philadelphia, producer of foundry sands, facings and a dealer in general foundry supplies and equipment, occupied a booth but exhibited no samples.

The Portage Silica Co. of Youngstown, Ohio, displayed samples of all of its products. These include Nos. 2, 3, 3½, 5½, 8 and 7-D washed and dried sand-blast sands and Nos. 4 and 7 green steel molding sands, either wet or dried; also, No. 5 wet core sand. The company was represented by E. E. Klooz, vice-president and general manager, Lee R. Farrell, secretary and sales manager, and C. F. Eberhart, chief clerk.

The Standard Silica Co., Chicago, exhibited all sizes of its Blackhawk brand silica and passed out to the foundrymen an interesting illustrated booklet describing their plant and operations at Ottawa. A. C. Goodnow, vice-president; F. D. Chadwick, plant manager, and R. W. McCandlish, sales manager, represented the company at the exhibit.

The United States Silica Co., Chicago, displayed flint shot sand-blast abrasive and flint silica core sand. Passersby attention was attracted to this booth by the display of odd-shaped castings which had been finished with flint shot. Company represented by Volney Foster, president; H. F. Goebig, vice-president and secretary; O. M. Olsen, R. R. Shuman and W. Kent.

The Whitehead Brothers Co., Buffalo, N. Y., had perhaps the most elaborate and most interesting exhibit of all, requiring four booths for the display. In addition to an array of a complete line of foundry sands, clays, gravels, foundry facings and supplies, the company displayed a rack of illuminated photographs in colors, showing the sand deposits, plants and workings. The company was represented by A. J. Miller, J. H. Whitehead, V. L. Whitehead, Jr., C. E. Andrews, R. L. Carpenter, T. Hogan, A. Y. Gregory, F. B. Clark, A. W. Jacus, H. S. Depew, A. McBride and H. B. Hanley.

Foundry sand exhibit at the American Foundry Men's Association meeting at Syracuse

A foundry sand exhibit of unusual educational value

Another attractive exhibit of a New York foundry sand producer

National Crushed Stone Association Reaches New Level of Usefulness

A. T. Goldbeck, Recently Senior Testing Engineer, U. S. Bureau of Public Roads, Becomes Director of Engineering Bureau of the Association; Offices Established in Washington, D. C.

EFFECTIVE October 15, A. T. Goldbeck, recently senior testing engineer, U. S. Bureau of Public Roads, became head of the new engineering bureau of the National Crushed Stone Association. Offices have been established in the Earle building, Washington, D. C. Effective November 15, J. R. Boyd becomes secretary of the association, succeeding A. P. Sandles, resigned, who has been secretary since the organization was perfected in 1918.

These changes are the culmination of the plans of President Otho M. Graves, whose ambitions for the future of the crushed-stone industry, we write without fear of contradiction, are exceeded by those of no other operator in the industry. His tireless, energetic and aggressive administration has already brought about co-operation in the industry which makes possible the realization of at least some of his ambitions immediately.

In announcing Mr. Goldbeck's appointment, President Graves states:

"The National Crushed Stone Association, having become convinced that the establishment of a bureau of engineering would be of benefit not only to the industry but to construction in general, has completed its plans for the establishment of such a bureau in Washington, D. C. The office of the director of the bureau, as well as that of the secretary of the association, will be in a suite of rooms in the Earle building.

"The reasons prompting the association to enter into this new form of activity are clearly indicated in the following conception of the functions of the bureau:

"1. To review the facts which have been established in respect to crushed stone through field and laboratory tests in order that such facts may be made available and plainly set forth for the benefit of both producer and consumer.

"2. To determine what characteristics of crushed stone require further investigation and to devise and suggest means whereby these characteristics may be determined and finally written into specifications.

"3. To stimulate thorough testing of aggregates in various government, state and collegiate laboratories, as well as in the field and to render such proper assistance as may be desired in carrying out such investigations.

"4. To interpret the results of researches on aggregates in an unbiased, straight-forward manner to the end that there will be no misunderstanding of the limitations and meaning of research results in the minds of the users or producers.

"5. To disseminate such facts as may become available from time to time as researches are brought to conclusion or as progress reports are issued. Technical articles, association bulletins, the presentation of technical papers, as well as personal contact, will all be used as means for conveying helpful information to those interested.

A. T. Goldbeck, Director of Engineering Bureau, N. C. S. A.

"6. To be of as much assistance as may be possible and desirable to state and municipal highway departments in all their problems involving the use of aggregates.

"7. To represent the interests of crushed stone on technical committees writing specifications for aggregates.

"8. To discover and disseminate information concerning uses for that portion of the product now largely wasted and so relieve the saleable portion of a then unnecessary cost burden. This, if successful, will greatly benefit both producer and consumer.

"9. To disseminate such data as may become available on production methods, to the end that economies may be effected.

"10. Through co-operation with engineering groups attempt to bring about simplification of sizes, thus leading to economies in production.

"11. To co-operate with other agencies to more nearly approach an equalization of seasonal construction of all sorts, to the end that more constant production may result, thereby relieving, to the benefit of producer and consumer, the peak loads which now occur through the production season.

"12. To extend all possible aid to bring about a better understanding between producer and consumer to the end that the desires of each will be more thoroughly understood and worked out in as practical a way as circumstances permit.

"13. To study the uses of aggregates for all forms of construction from the standpoint of their relative economy and value.

"14. In general, to advance the interests of crushed stone in a frank, straight-forward, scientific and ethical manner free from bias and without recourse to unworthy attacks on any other aggregates.

"We are assured that these functions of the bureau will be fully carried out by reason of the fact that A. T. Goldbeck, at present chief of the division of tests, of the United States Bureau of Public Roads, will act as director of the bureau. Mr. Goldbeck is known throughout the country as a distinguished engineer, particularly in his chosen line of testing materials. For several years after graduating from the civil engineering department of the University of Pennsylvania in 1906, he engaged in teaching mechanics of materials and testing materials at his alma mater and at Lafayette College. In 1910 he left Lafayette to join the personnel of the Office of Public Roads in Washington as engineer of tests and held this position for three years. At the conclusion of this period and until 1915, he was assistant engineer in charge of the municipal laboratory of the city of Philadelphia. He then returned to the reorganized Office of Public Roads as engineer of tests in work of a greatly enlarged scope. During the past six years he has been chief of the division of tests of the bureau in charge of all tests and investigations, with

from 60 to 80 employes, conducting investigations on bituminous and non-bituminous road materials in the laboratory and field, on subgrade materials, on important bridge researches with an annual expenditure for this work of approximately a quarter of a million dollars. He has originated testing equipment, some of which is used throughout the world. He is largely responsible for the soil pressure measuring cell which bears his name and which has been widely used for measuring earth pressures on various structures. He has also developed a frequently used graphic strain gauge for investigation of stresses in concrete, as well as various other pieces of apparatus.

"At present he is chairman of the following committees:

"Committee C-9 on Concrete and Concrete Aggregates of the A. S. T. M.; Sub-committee on Non-bituminous Road Materials of Committee D-4, A. S. T. M.; Committee on Road Materials of the Federal Specifications Board; Committee on the Structural Design of Highways, Highway Research Board, National Research Council.

"He is also a member of the following committees:

"Committee on the Structural Design of Highways of the American Association of State Highway Officials; Committee E-1 on Methods of Testing of the A. S. T. M.; Committee on Research of the American Society of Civil Engineers; Joint Committee on Concrete and Reinforced Concrete (Appointed by the A. S. T. M.); Alternate on the American Engineering Standards Committee.

"It is probable that in his new connection he will find it proper to resign his chairmanship and membership on several of these committees.

J. R. Boyd, new secretary, N. C. S. A.

"He is known as a prolific writer and has presented technical papers before the foremost technical societies in the United States, as well as numerous colleges and universities.

"The association deems itself most fortunate in being able to secure the services of Mr. Goldbeck, who is not only a distinguished engineer, but whose character, integrity and probity are such as will assure all who may have dealings with the bureau of the scholarly and scientific treatment which will be accorded problems brought to him for consideration.

"The office of the secretary of the association, which was formerly in Columbus, Ohio, will be in offices adjacent to the director of the Bureau of Engineering, the new secretary being J. R. Boyd. Mr. Boyd is a graduate engineer, having attended night classes in George Washington University, an institution famous for the quality and the character of its graduates, particularly those who have availed themselves of the opportunity to work in our national capitol and study in its halls at night.

"For the past six or seven years, Mr. Boyd has been an assistant engineer of testing in the United States Bureau of Public Roads and has worked in close co-operation with Mr. Goldbeck. He is chairman of the Committee on Subgrades of the State Highway Officials' Association and his research along this line of endeavor has attracted national attention.

"Mr. Boyd is an engineer of promise and ability, of engaging personality, with that unusual combination enabling a man to undertake successfully scientific research and to impart the knowledge thus gained simply and forcefully to others. He is admirably adapted by experience, training and character to undertake the work of secretary of the association and it is believed that the joint offices in Washington will be not only of value to the industry but of service to engineers, architects and highway builders."

Some Reminiscenses of the National Crushed Stone Association

Really Had Its Beginning at Chicago in 1903; A. J. Blair the Only Surviving Member of the Original Gathering

By Nathan C. Rockwood
Editor-Manager, Rock Products

TRADE ASSOCIATIONS, being merely groups of humans, exhibit most of the characteristics of human individuals. They are conceived, born, are nursed through a period of infancy, learn to walk and eventually attain a period of increasing prestige and usefulness. We presume, like individuals, they will also grow old and senile, although with able management they should have everlasting youth. One by one the rock products associations have passed the nursing stage and become useful members of society. The latest of these to attain its majority is the National Crushed Stone Association.

We feel a peculiar regard for this association, for its growth and development has been coincident with our own; and the writer's own very first contact with the rock products industry was with the founders of this association. We also helped to nurse it in the days of its infancy; and we are therefore now entitled to rejoice in the approaching achievement of the dreams of some of those who conceived it. So may we be permitted to do a little reminiscing?

It is generally assumed that the National Crushed Stone Association had its beginning at Chicago in 1918; as a matter of fact the first movement for a national quarry association goes back to 1903, when the late E. H. Defebaugh, then editor and publisher of Rock Products, printed the following announcement on the first page of the April, 1903, issue:

"Now for a National Association of Quarry Owners"

And now the association spirit is creeping

into the thoughts of the quarry owners of the country, which has moved a number of them to suggest that we start the ball rolling and get together the quarry owners of the country in a national association. This is the proper spirit, and we are glad to see it moving, for association is the order of the day, and there is much that may be done in a good national association of quarry owners to make the life of those in the trade more pleasant and profitable. For example, there is the ever recurring question of labor disputes and differences that can be better handled and adjusted by the co-operation of all in the trade than by individuals, or even the associating together of a local body. Then there are matters of transportation and freight rates that require frequent attention; there comes with national association a chance to compare notes on methods and appliances for quarrying, and also to compare and discuss costs of crushed stone and other products of the quarry. In fact, the longer one looks at the subject for possibilities in this line, the more one can find in the way of opportunities for general benefit to the trade in the meeting together of quarry owners from all parts of the country.

There is really no question as to benefits; it is simply a question now of whether or not the majority of the quarry owners of the country want a national association. That some want it, we know, for we have already been appealed to in the matter, but before attempting to get together a gathering for the purpose of organizing such an association, we desire to have an expression from the trade at large, that we may know how many have the association spirit and how many have not, and to this end we desire to ask every quarry owner to write this office and give his views on the subject. A letter to this effect has been sent out to the trade, and if you have received one, we hope you will think the subject over carefully and give us the benefit of your conclusions to guide us in the matter; and if you did not get a letter, the failure is due to some error, and we desire you to consider the matter set forth herein in lieu of a letter and write us your conclusions on the subject after thinking it over carefully. We do not need suggestions to convince us about the benefits of associated effort, for we know from experience in this line that association pays, and pays in more ways than one, and for this reason we are very anxious to see all lines of the industries represented by Rock Products thoroughly organized, because the mission of a live trade paper is to help the trade to better business, more business, and in every way to make business more profitable and pleasant, but it would not be assisting the quarry owners for us to try to form an association if you do not want an association and will not co-operate in such a movement, and that is why we want to know how you feel about it. We are willing and ready to do the work, any amount of it, to get up an association to solve some of the quarry owners' problems, if you are ready and willing to co-operate in such a movement.

A meeting took place in Chicago on the following May 19. Mr. Defebaugh, temporary chairman, in calling the session to order gave W. H. Wallace, of the Wallace Lime and Stone Co., Bayport, Mich., the credit for having originated the movement. D. McL. McKay, of the Perry-Matthews-Buskirk Stone Co., Chicago, was elected president, W. H. Wallace, vice-president, and E. H. Defebaugh, secretary. This first organization included cut-stone quarry men as well as crushed-stone quarry men.

The objects of this association, as set

A. J. Blair, first president of the N. C. S. A., who has the distinction of being the only member of the association who attended the 1903 quarry owners' meeting

forth in Article 2 of the constitution of the National Quarry Owners' Association, were as follows: "To promote social intercourse, discussions of all subjects of general interest to the trade, to organize and foster local

A. P. Sandles, secretary of the N. C. S. A. 1918-1925

associations, to improve and promote better methods in the quarrying and sale of stone, to take action to compete with other trades, to adopt ways and means to increase the sales of its members, to favor, and co-operate for a fair classification and equitable rates of freight, and take action on all special questions for the advancement of the interests of the trade."

Quarry owners from as far as Phoenix, Ariz., attended the meeting. Very few of them are known to the quarry industry of today. A. J. Blair, of the Lakeshore Stone Co., Milwaukee, Wis., was prominent in forming this organization, and was elected a director. Rock Products was made the official organ of the association.

The next meeting was held in Chicago on January 21, 1904. H. D. Martin, of the Dolese and Shepard Co., Chicago; William Hammerschmidt, of the Elmhurst-Chicago Stone Co.; A. C. O'Laughlin, Chicago; A. P. Davis, of the Davis Bros. Stone Co., Lannon, Wis., and A. J. Blair were some of the crushed-stone quarry men who attended this meeting. There were two days of sessions; and one of the subjects discussed was: "To what extent is the quarry industry solving the problem of waste stone in the quarry?"

Another year went by before anything further was heard of organization. Then on February 23, 1905, another meeting opened in Chicago. Pretty much the same old guard attended, with the addition of Charles P. Biesanz, of the Biesanz Stone Co., Winona, Minn. It is interesting to note that machinery and supply manufacturers were admitted to *honorary membership*, without the power to vote or hold office, on signing the constitution and the payment of dues ($10 a year).

The report of the secretary (Mr. Defebaugh) was rather discouraging; and it would seem the movement died shortly afterward for lack of support by quarry men. It was dead a long time.

When the present editor of Rock Products came on the job in the latter part of 1917 he inherited these old and some new responsibilities for organizing a national quarry association. Letters were just being mailed to the industry to ascertain the attitude toward an immediate reorganization; and in co-operation with the Illinois, Indiana and Ohio state crushed stone associations Rock Products again took the initiative in calling a meeting to be held in Chicago on February 7, 1918.

Under the impetus given by the declaration of war and the conditions created by it in all branches of industry, the need of organization was now so apparent that the response to these letters insured a successful meeting. Prior to this date, however, the Ohio Macadam Association had issued the call for its annual meeting at Columbus, Ohio, on January 16; and Secretary Sandles and the editor of Rock Products endeavored to get as many quarry men as possible to attend this Columbus meeting and lay more definite plans for the organization of the proposed National Crushed Stone Association.

The editor will never forget his trip to Columbus and his precipitation into the

problems of the quarry industry, nor the cordiality of his reception by quarry men. He came into their midst with considerable engineering and editorial experience, but as an entire stranger; and he left Columbus feeling a full-fledged member of the fraternity—due in no small measure to the brotherly interest and helpfulness of A. P. Sandles, secretary of the Ohio Macadam Association.

Rock Products, January 30, 1918, contained a report of this meeting which opened with the following paragraph: "Notwithstanding the most severe snow storms in recent years, with consequent crippled transportation systems, the abruptness of the notice, and the sub-zero weather, enthusiastic delegates from ten states met at Columbus, January 16, and formed the National Crushed Stone Association."

A. P. Sandles presided and his patriotic and inspirational address made up for the cold outside. Here are the official minutes of this meeting:

Official Minutes of the First Meeting of the National Crushed Stone Association

Representatives of the crushed stone industry from several states met at the Chittenden hotel, Columbus, Ohio, at 1 p. m., January 16, 1918, to organize a national association.

A. P. Sandles, secretary of the Ohio Macadam Association, Columbus, called the meeting to order, and asked for a roll call. The following named states were represented:

ILLINOIS—A. J. Sullivan, president, Illinois Crushed Stone Association, Chicago; E. J. Krause, Columbia Quarries Co., St. Louis, Mo.

IOWA (by proxy)—R. W. Scherer, Milwaukee, Wis.

INDIANA—V. G. Pogue, president of the Indiana Crushed Stone Association, Indianapolis; F. W. Connell, secretary, Indiana Crushed Stone Association, Indianapolis; E. B. Taylor, treasurer, Indiana Crushed Stone Association, Indianapolis.

MISSOURI—Mr. Edw. Hely, Cape Girardeau; Mr. Norman Hely, Cape Girardeau.

MICHIGAN—H. E. Bair, Toledo, Ohio.

WISCONSIN—A. J. Blair, president, Wisconsin Crushed Stone Association, Milwaukee; R. W. Scherer, secretary, Wisconsin Crushed Stone Association, Milwaukee.

OHIO—L. H. Hawblitz, president, Ohio Macadam Association, Toledo; A. Acton Hall, Piqua; Allen Patterson, Lima; W. W. Keever, Columbus; J. F. Pogue, Findlay; J. A. Moore, Bellevue; R. C. Roach, Waterville; E. E. Evans, Toledo; W. H. Loy, Piqua.

KENTUCKY—T. B. Ripy, Lawrenceburg; Ky.; Clarence Kohn, Van Wert, Ohio.

Mr. Sandles briefly stated the object of the call.

The chairman asked the question: "Are you in favor of a National Association?"

The answer was "Yes," unanimously.

The chairman called on Mr. Krause for a few remarks, who, among other things, suggested appointment of committees and a temporary organization.

The chairman also called on Mr. Sullivan, who agreed with Mr. Krause in that each state have delegates, and each state have officers, i. e., two officers to each state in the national organization. He also favored each state being represented on the Board of Trustees.

Mr. Sullivan moved and Mr. Hawblitz seconded a motion that the chair proceed to appoint committees along with Mr. Krause's suggestions. The chair appointed the following to act as members of the Finance Committee:

Illinois—Mr. Krause.
Indiana—Mr. Milligan.
Michigan—Mr. Bair.
Wisconsin—Mr. Scherer.
Iowa—Mr. Hall.
Missouri—Edw. Hely.
Ohio—Mr. Hawblitz.
Minnesota—J. J. Sloan, Chicago, Ill.
Kentucky—T. B. Ripy, Kentucky River Stone and Sand Co., Lawrenceburg, Ky.

The motion prevailed that the Finance Committee meet at the Congress Hotel, Chicago, Ill., 9 a. m. Monday, January 21, 1918.

The question of a name for the association was discussed. After discussion the

Otho M. Graves, president of the N. C. S. A., to whose energetic administration the development of the association into a crushed-stone research organization is due

motion prevailed to call the association the National Crushed Stone Association.

The chairman asked the states to select their representatives to act as members of the committee on Constitntion and By-Laws.

A. J. Blair, Milwaukee, was made temporary chairman.

F. W. Connell, Indianapolis, was made temporary secretary.

A. P. Sandles was selected to represent the National Crushed Stone Association at the meeting of the Highways Industries Association at Chicago, Ill., Monday, January 21, 1918.

Messrs. Hawblitz moved and Sullivan seconded a motion that each state in the organization send two delegates to Washington to get the concurrence of eastern stone producers and with authority to elect permanent officers and with power to act. The motion was carried.

After discussion it was decided to attend the meeting called for Chicago, February 7-8, 1918, after which a motion to adjourn prevailed.

Organization Perfected

At the meeting subsequently held at the La Salle hotel in Chicago on February 7 and 8, 1918, delegates were present from every organized group of crushed-stone quarry men in the United States and Canada. Among those present who were not at the Columbus meeting and who have since become prominent in the association were: John Rice, president of the General Crushed Stone Co., Easton, Penn; F. W. Schmidt, president of the North Jersey Quarry Co., Morristown, N. J.; W. L. Sporborg, president of the Rock-Cut Stone Co., Syracuse, N. Y.; James Savage, general manager of the Buffalo Crushed Stone Co., Buffalo, N. Y., and C. M. Doolittle, president of the Canada Crushed Stone Corp., Ltd., Dundas, Ont.

A. J. Blair, who had been elected temporary president at the Columbus meeting, was unanimously elected president, and John Rice, vice-president. A board of directors was elected which appointed A. J. Sullivan, of Chicago, treasurer, and Nathan C. Rockwood, of Rock Products, temporary secretary. A constitution and by-laws were drafted and adopted.

A directors' meeting of the National Crushed Stone Association was held in Baltimore on February 26, and this meeting was attended by two New England crushed-stone producers, who have since been guiding geniuses of the association—W. Scott Eames, vice-president and general manager of the New Haven Trap Rock Co., and B. D. Pierce, Jr., then president of the Connecticut Quarries Co., New Haven, Conn. The next activity of the association was a meeting of the executive committee at Chicago on April 9, when A. P. Sandles was appointed executive secretary with offices at Columbus, Ohio, succeeding the writer, who had served as temporary secretary from the organization meeting in February to the date of this meeting.

With the subsequent history of the organization all are familiar. It has grown in strength, prestige and usefulness under each succeeding president—A. J. Blair, John Rice, E. J. Krause, W. Scott Eames, F. W. Schmidt, John J. Sloan and now under its young and aggressive president, Otho M. Graves, it has built up resources to carry out a program which places it on a par with trade or industrial associations of the highest rank.

Study of Whiting

A STUDY of the production and utilization of whiting has been undertaken by the Bureau of Mines of the Department of Commerce. W. M. Weigel, mineral technologist, has begun the collection and tabulation of available published information and has established contact with domestic producers.

Hints and Helps for Superintendents

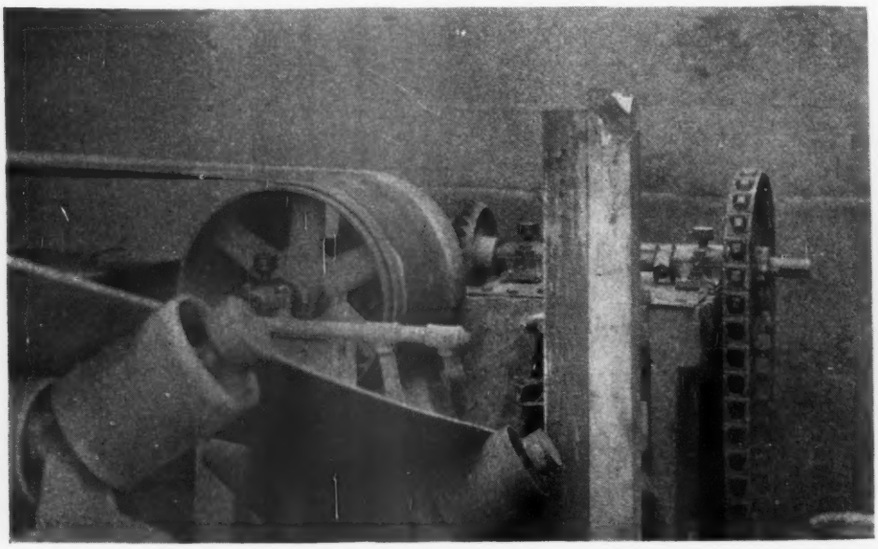
Washing Gravel on an Inclined Belt Conveyor

AN excellent device for washing (or rinsing) gravel just before loading into cars is in use at the plant of the J. C. Stewart Co., at Oxford, Mich. At this plant the different sizes of sand and gravel are held in a series of bins under which there is a concrete lined tunnel in which a conveyor belt runs. This belt discharges on another conveyor which loads it on to a railroad car. The junction of the two conveyors is shown in the picture.

The loading conveyor, which is shown in front, has a considerable inclination and advantage is taken of this to wash the gravel as it is loaded. A pipe with nozzles, which are made of 1-in. pipe nipples flattened at the end, throws water across the full width of the belt. Owing to the inclination of the belt the water runs off at the lower end while the rinsed gravel goes on to the car arriving there in a fairly dry condition. This is much better than the common practice of washing off the gravel in the car with a hose, as that method sends a lot of the mud and clay to the bottom of the car, where it remains. By the method shown here all the mud and clay is carried off by the water running over the end of the belt.

There is another good "hint" at this point but unfortunately a photograph could not be taken to show it clearly. This is a steel plate which is fastened to the post shown. The edge may be seen just over the conveyor roller near the post. This plate is hung from the top and may be set at any angle. It receives the discharge from the first conveyor and delivers it on the second at any point desired. In this way the second conveyor is loaded evenly. The plate had to be made movable because it has to be set at a different angle for loading sand and gravel.

Both these "hints" were devised by C. G. Knoblauch, the superintendent of the plant.



Scheme for washing gravel on an inclined conveyor

Safe Loads on Chains

THE table below, calculated by a prominent chain manufacturer, as a result of extensive research work, should prove helpful to many a plant superintendent and foreman. It illustrates the well-known law of mechanics that the less bend or sag in a chain or cable, the more easily it is broken by a pull at right-angles to the sag. This must be taken into account in the construction of small suspension bridges and the like, as well as in handling heavy bodies as illustrated.

SIZE OF CHAIN	WHEN USED AT 60° ANGLE	WHEN USED AT 45° ANGLE	WHEN USED AT 30° ANGLE	WHEN USED AT 20° ANGLE	WHEN USED AT 15° ANGLE	WHEN USED AT 10° ANGLE	WHEN USED AT 5° ANGLE
5/16"	15580	12700	9000	6150	5550	3200	1560
3/8"	22900	18700	13250	9050	6850	4730	2300
7/16"	29400	24000	17000	11600	8790	6070	2960
1/2"	37200	30500	21500	14700	11100	7770	3750
9/16"	48500	39600	28000	19150	14500	10000	4900
5/8"	60400	49400	34900	23900	18000	12400	6000
3/4"	70500	57500	40700	27800	21000	14500	7100
7/8"	82100	67000	47400	32400	24500	16900	8200
1"	94900	77500	54800	37500	28000	19600	9500
1 1/8"	102500	83700	59200	40500	30600	21100	10300
2"	125300	103900	73500	50300	38000	26200	12800

SUGGESTIONS

1. DISTRIBUTE LOAD EVENLY ON BOTH LEGS
2. A CLEAN CHAIN LASTS LONGER
3. KEEP CHAINS FREE FROM TWISTS AND KNOTS.
4. INSPECT CHAIN AT REGULAR INTERVALS
5. EVERY TIME A CHAIN IS OVERLOADED IT IS WEAKENED.
6. WORK WITH YOUR SAFETY COMMITEE.

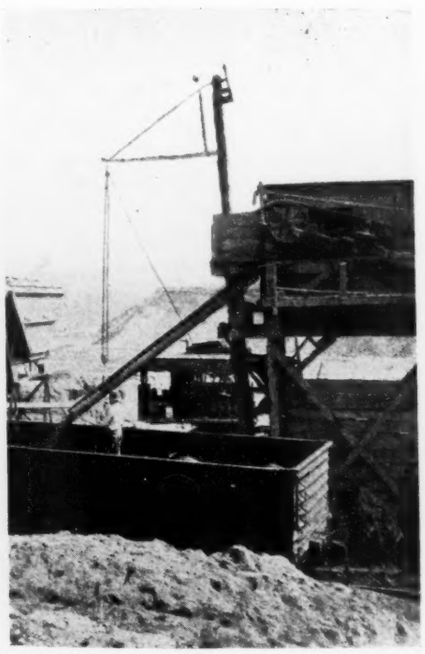
FOR ADDITIONAL INFORMATION WRITE

S. G. TAYLOR CHAIN CO.
140 S. DEARBORN ST.
CHICAGO ILLINOIS.

Table and diagrams showing safe load on chains of different sizes with various angles of hook-up

Sluicing Sand to Storage

MOVING sand from one part of a storage yard to another often involves a



Sluicing sand from storage to car or new storage pile

transportation problem. To pick it up with a crane, load it into a car, move the car to the new position and unload it there is somewhat expensive, even where the tracks are laid. If water and the proper fall from one part of the yard to another are available the cheapest way to move the sand is to sluice it to the new position by means of a stream of water.

The picture shows how this was done at the plant of the Detroit Gravel and Stone Co., at Oxford, Mich. A rough hopper was built and supported on poles. This received the sand which was lifted to it by a gas crane on crawler treads. Water was pumped to the hopper through the pipe shown at the right and this carried the sand out through the trough at the left. The trough has an inclination of about an inch to the foot.

The inclination to be used will depend on the distance to be covered and the fall available, and it is important to use as great an inclination as possible in order to save water. Ordinary sand will run well on two inches to the foot if the pulp contains 60% sand and 40% water. A pulp containing 70% sand and 30% water requires from 3 in. to 3½ in. to the foot, the inclination depending on the grading of the sand. Fine sands will run on a much flatter angle than coarse sands for the same moisture content.

Repairing a Gyratory Crusher by Oxy-Acetylene Welding

FIG. 1 shows the broken section of the stone crusher. The break extended entirely around the casting just below the top flange, which was also broken across in two places. From the main crack, three others extended down toward the base of the casting. The total length of breaks to be welded was about 15 ft. The broken top flange was 6 in. wide and 4 in. thick while the sides were from 1½ to 2 in. thick.

Edges of the break were beveled and cracks veed out with the cutting blowpipe—a great time saver on these heavy sections of cast iron. Pieces of the flange were then fitted back in place and securely tack-welded. After turning the casting over (top flange down) a temporary preheating furnace was built up around it. Because of a light internal baffle, visible in Fig. 1, it was necessary to preheat very slowly, taking about 4 hours to come to heat. Welding the lower part of the flange was then done with the casting thus inverted.

In order to get at the main break, the casting was turned on its side. After being heated up again, two welders started at opposite points on the sides working along the main break toward the top.

As cracks extending away from the main break were reached, they were welded, beginning at the far end. Several times it was necessary to stop and reheat the casting.

Turning the hot casting over in order to complete the welding proved to be quite a task. Even though done as quickly as possible, the casting cooled down somewhat and had to be reheated. Additional heating was also required several times while welding the break on this side because it is almost impossible to prevent a hot casting from cooling while the welding operation is in progress.

Setting the casting right side up and welding the top of the flange completed the welding operations. The casting was placed on its side again, covered with asbestos paper, heated up thoroughly, and then allowed to cool very slowly by permitting the fire to die down.

Monday morning the casting was ready for service.—*Oxy-Acetylene Tips.*

Fig. 1—Broken cast iron stone crusher base

Fig. 2—Pieces aligned and tacked

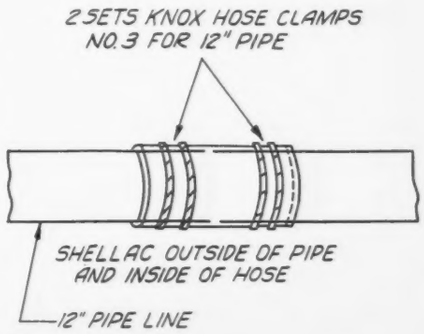
Fig. 3—Preheating in temporary furnace

Sleeve Holder for Dredge Pipe Line

By C. B. DENTON
Vice-President, Denton Service Co.
Pacific, Mo.

WE operate a 12-in. dredge stationary discharge line and have been bothered for a year with the rubber sleeves pulling off. We have tried several methods of holding them on and spent hundreds of dollars through delays when they pulled off. Now we simply use two sets of No. 3 Knox hose clamps on each end of the rubber sleeve and shellac the pipe and hose well, then tighten up the clamps. They will not put off with all the abuse you can give. This kink is worth $1000 to any man with a similar operation. The line is flexible at all times.

P. S. Your Hints and Helps column in Rock Products is a winner and your $5 a kink a good thing.



Scheme for holding dredge pipe-line sleeves in place

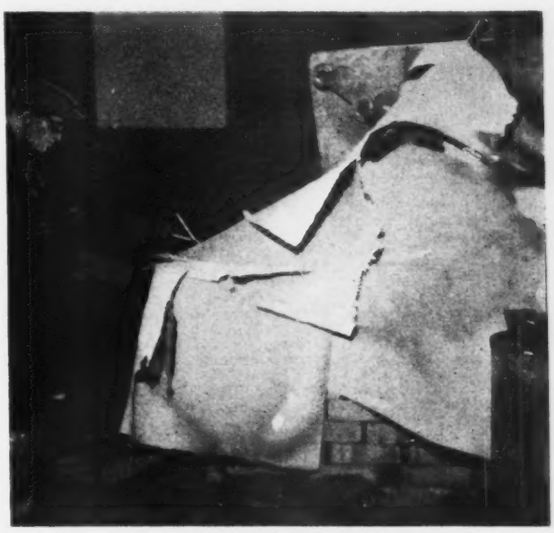


Fig. 4—Welding with casting covered to exclude drafts

Financial News and Comment

Bankers Offer New England Lime Company Class B Preferred Stock

NEW ENGLAND LIME CO.'S new issue of 7% preferred stock series B (details of offering in September 5 issue, ROCK PRODUCTS) were put on public sale September 14 by the following bankers who underwrote the issue: E. B. Merritt and Co., Bridgeport, Conn.; Francis S. Haynes, Danbury, Conn.; W. C. Simons, Inc., Springfield and Pittsfield, Mass., and Fuller, Ritcher and Aldrich Co., of Hartford, Conn.

Price is set at 97½ plus accrued dividend with a bonus of 2 shares no par common stock (V. T. C.) with every purchase of 5 shares. This preferred stock is tax free in Connecticut. It is stated to have an asset value per share of $275 and for the past five years has earned an average of 3.18 times the preferred stock dividends, after interest charges, depletion, depreciation and taxes. The common stock has a book value of in excess of $60 a share and last year earned at the rate of $9 a share. The company has recently passed resolutions restricting further issuance of class B preferred stock.—*Danbury (Conn.) News.*

U. S. Gypsum Restrains Infringements of Its Patents

A PERPETUAL injunction restraining the Bestwall Manufacturing Co., American Cement Plaster Co., Beaver Board Co. and Beaver Products Co. from infringeing patents of the U. S. Gypsum Co. was granted the latter firm recently at Chicago by Federal Judge James S. Wilkerson. The patents involved certain improvements in the manufacture of plaster. (Full details of the court decision can be found in August 22 issue, page 64.)

Charles B. Morrison was appointed Master in Chancery to assess damages, which are reported to amount to several million dollars. The original patent, granted to C. W. Utzman, in 1912, has been a cause of continual litigation.

Security Bonds Called

ALL of the outstanding second mortgage 20-year 5% gold bonds of the Security Cement and Lime Co., Hagerstown, Md., dated January 1, 1912, have been called for redemption January 1, 1926, at par and interest at the Baltimore Trust Co., 25 East Baltimore street, Baltimore, Md.

Holders may present the above bonds for payment at the trust company prior to January 1 and receive par and interest to date of such presentation.

RECENT QUOTATIONS ON SECURITIES IN ROCK PRODUCTS CORPORATIONS

(These are the most recent quotations available at this printing. Revisions, corrections and supplemental information will be welcomed by the editor.)

Stock	Date	Par	Price bid	Price asked	Dividend rate
Alpha Portland Cement Co. (common)**	Oct. 12	100	136	140	1¾% quar. Sept. 1
Alpha Portland Cement Co. (preferred)**	Oct. 5	100	110	.....	1½% quar. Sept. 1
Arundel Corporation (sand and gravel—new stock)	Oct. 14	No par	34½	34⅞	30c quar. Oct. 1
Atlas Portland Cement Co. (common)	Oct. 10	No par	64½	66	50c quar.
Atlas Portland Cement Co. (preferred)	.....	100	.....	.....	2% quar. Oct. 1
Atlas Portland Cement Co. (preferred)**	Oct. 5	33⅓	45	.....	2% quar. Oct. 1
Bessemer Limestone and Cement Co. (common)‡	Oct. 10	100	130	133	1½% quar. Oct. 1
Bessemer Limestone and Cement Co. (preferred)‡	Oct. 10	100	105	108	1¾% quar. Oct. 1
Bessemer Limestone and Cement Co. (convertible 8% notes)‡	Oct. 10	.....	110	120	8% annual
Boston Sand and Gravel Co. (common) (d)	Oct. 5	100	70	70	2% quar. July 1
Boston Sand and Gravel Co. (preferred) (d)	Oct. 5	.....	.....	80	1¾% quar. Oct. 1
Boston and and Gravel Co. (1st preferred) (d)	Oct. 5	.....	.....	90	2% quar. Oct. 1
Canada Cement Co., Ltd. (common)	Oct. 14	100	107	108	1½% quar. Oct. 16
Canada Cement Co., Ltd. (preferred) (f)	Oct. 5	100	117	117½	1¾% quar. Aug. 15
Canada Cement Co., Ltd. (1st 6's, 1929) (f)	Oct. 5	.....	102	103	3% semi-annual A&O
Charles Warner Co. (lime, crushed stone, sand and gravel)	Oct. 10	No par	22	25	50c quar. Oct. 10
Charles Warner Co. (preferred)	Oct. 10	100	98	102	1¾% quar. Oct. 22
Dolese and Shepard (crushed stone) (a)	Oct. 14	100	50¾	51½	1½% quar.
Giant Portland Cement Co. (common)**	Oct. 10	50	38	40	
Giant Portland Cement Co. (preferred)**	Oct. 5	50	54	57	3½% semi-ann. June 15
Ideal Cement Co. (common)‖	Oct. 14	No par	65	75	$1 quar. June 30
Ideal Cement Co. (preferred)‖	Oct. 7	100	107	109	1¾% quar. June 30
International Cement Corporation (common)	Oct. 14	No par	77¼	78¼	$1 quar. Sept. 30
International Cement Corporation (preferred)**	Oct. 7	100	104	106	1¾% quar. Sept. 30
International Portland Cement Co., Ltd. (preferred)	Mar. 1	.....	30	45	
Kelley Island Lime and Transport Co.	Sept. 28	100	110½	115	2% quar. Oct. 1
Lawrence Portland Cement Co.**	Oct. 5	100	110	.....	2% quar.
Lehigh Portland Cement Co.‖	Oct. 7	50	88	91	1½% quar.
Michigan Limestone and Chemical Co. (common)‖	Oct. 7	.....	23	.....	
Michigan Limestone and Chemical Co. (preferred)‖	Oct. 7	.....	23	.....	1¾% quar. July 15
Missouri Portland Cement Co.	Oct. 14	25	70	70¼	25c quar. Oct. 1; 25c ex. Aug. 1
Missouri Portland Cement Co. (serial bonds)	May 29	.....	104½	104½	3½% semi-annual
Monolith Portland Cement Co. (common) (c)	Oct. 6	.....	8¾	8¾	
Monolith Portland Cement Co. (units) (c)	Oct. 6	.....	22¾	24¼	
Monolith Portland Cement Co. (preferred) (c)	Oct. 6	.....	7¼	7¾	
North American Cement Corp. 6½s 1940 (with warrants)	Oct. 10	.....	98½	98¾	
Pacific Portland Cement Co., Consolidated ($)	Oct. 10	100	85	88	
Pacific Portland Cement Co., Consolidated (secured serial gold notes)§	Oct. 7	.....	99¾	100½	3% semi-annual Oct. 15
Peerless Portland Cement Co.*	Oct. 10	10	6½	8	
Petoskey Portland Cement Co.*	Oct. 10	10	9¼	10½	1½% quar.
Pittsfield Lime and Stone Co. (preferred)	.....	100	.....	.....	2% quar. Apr. 1
Rockland and Rockport Lime Corp. (1st preferred) (d)	Oct. 5	100	.....	98	3½% semi-annual Aug. 1
Rockland and Rockport Lime Corp. (2nd preferred) (d)	Oct. 5	100	.....	70	3% semi-annual Aug. 1
Rockland and Rockport Lime Corp. (common) (d)	Oct. 5	No par	.....	70	1½% quar. Aug. 1
Sandusky Cement Co. (common)*	Sept. 28	100	103	106	2% quar. July 1
Santa Cruz Portland Cement Co. (bonds) ($)	Oct. 10	.....	104½	106	6% annual
Santa Cruz Portland Cement Co. (common) ($)	Oct. 10	50	72½	73½	$1 April 1
Superior Portland Cement Co.	Mar. 1	100	.....	120	
United States Gypsum Co. (common)	Oct. 14	20	200½	202	2% quar. Sept. 30; $1 ex. Sept. 15
United States Gypsum Co. (preferred)	Oct. 12	100	116½	118	1¾% quar. Sept. 30
Universal Gypsum Co. (common)†	Oct. 14	No par	20½	23	
Universal Gypsum V. T. C.†	Oct. 14	No par	19	22	
Universal Gypsum Co. (preferred)†	Aug. 5	.....	76	.....	1¾% quar. Sept. 15
Universal Gypsum Co. (1st mortgage 7% bonds)†	Oct. 14	.....	99	(at 6½%)	
Wabash Portland Cement Co.*	Aug. 3	50	60	100	
Wolverine Portland Cement Co.	Oct. 12	10	10	10¾	2% quar. Aug. 15

*Quotations by Watling, Lerchen & Co., Detroit, Mich. **Quotations by Bristol & Bauer, New York. †Quotations by True, Webber & Co., Chicago. ‡Quotations by The Valley Investment Co., Youngstown, Ohio. §Quotation by Freeman, Smith & Camp Co., San Francisco, Calif. ‖Quotations by Frederic H. Hatch & Co., New York. (a) Quotations by F. M. Zeiler & Co., Chicago, Ill. (b) Quotations by De Fremery & Co., San Francisco, Calif. (c) Quotations by A. E. White Co., San Francisco, Calif. (d) Quotations by Lee, Higginson & Co., Boston, Mass. inson & Co., Boston, Mass. (f) Nesbitt, Thomson & Co., Montreal, Canada.

Editorial Comment

Irony in These Scientific Facts

One of the most interesting (to us at least) phases of the rock products industry is the competition and rivalry between the quarry and sand and gravel industries. This rivalry extends so far in some cases that quarry men feel that they must tie up all their promotional efforts with macadam roads because they are sure no sand and gravel can be used here, while there is a chance that they may lose to gravel in concrete road construction.

Yet all the time scientific research is bringing these industries closer together, and will in time, we are sure, demonstrate to the satisfaction of all that neither is independent of the other, and that they must not only live together always in the same house, but must ever supplement each other's promotional efforts. Sand will always be used in concrete pavements, whether gravel or crushed stone is used for the coarse aggregate; and now, irony of ironies, it looks very much as if satisfactory macadam roads could not be built with a sub-base of sand.

In a long report on "The Present Status of Subgrade Studies," by A. C. Rose, in the September issue of *Public Roads* (published by the U. S. Bureau of Public Roads) are some items of great interest and significance to rock products producers, but none perhaps harder for quarry men to take than this:

Sand subbase prevents soil from working up into voids of macadam—Another adverse effect of clay soils was brought out in a discussion before a meeting of the Boston Society of Civil Engineers by John R. Rablin, chief engineer, park division, Metropolitan District Commission of Massachusetts. "We have found, where we have a clay subgrade, that if we lay crushed stone or coarse gravel over it before laying our macadam, in a few years, if we have occasion to excavate, most of the stone seems to have disappeared and the clay to have come to the surface or mixed with the stone. This action is probably due to frost and moisture. We have also found that by covering the clay with a layer of fine sand before putting on the coarse gravel or stone, it will prevent that to a large extent." Here are data which not only describe a condition but also advocate a sand sub-base as a method of correction. Experiments of the Bureau of Public Roads at the Arlington Farm confirm this as a practical subgrade treatment.

Further on in this report we learn that limestone dust or screenings, for some reason or other, will not serve the purpose of sand in subgrade treatment—in fact, it makes conditions worse. The principal other conclusion in this report is that clay subgrades are responsible for most of the failures in all types of pavement; and that the most efficient way to correct this subgrade condition is to put a layer of sand between the pavement and the subgrade.

There is also a lot of consolation in this report for those on whose material is placed the odium for the cracking of concrete pavements—be it cement, stone, or gravel. So very little is known of subgrades and their effect on the pavement that no investigator has the right to compare one piece of pavement with another on the basis that the subgrade conditions are the same. A quotation from this report reads: "Practically all unprejudiced observers agree that the Bates road site (in Illinois) fulfilled these conditions (of a uniform subgrade) as ideally as could be expected on a length of road of two miles or more. No visible variation in the character of the soil could be detected; on the other hand, no positive method of establishing beyond question the lack of variation in subgrade soil could be found."

A Triumph of Business

Some months ago, June 13, to be exact, we published a news item that our good friend and that shining light in the lime industry—William E. Carson—was managing the Virginia gubernatorial campaign of Harry F. Byrd. Later he informed us that his candidate had won the primaries, but he has modestly neglected to tell us that Mr. Byrd is now the governor of Virginia. We chanced to learn about it through an editorial in the New York *World*, which began as follows:

According to a correspondent of *The World*, the new governor of Virginia, Hon. Harry Flood Byrd, will seek to clip the plumage of colonels. He would reduce the number on his staff, and appoint these, as far as possible, from officers of the National Guard. No doubt he shares the bias of Gov. Ritchie of Maryland, who refused to appoint any colonels whatever.

We do not know whether Mr. Carson ever had aspirations to be a Virginia colonel or not, but the item quoted bears out what Mr. Carson once said, that his candidate was a business man, that the campaign was being handled on business lines, and that the governor would give the state a business administration. Mr. Carson did not wish us to put much emphasis on these business virtues prior to election, for fear that might be used against his candidate in the Old Dominion, where politics are more vital and more honored as a profession than in most other states, but now we presume, from the item quoted, the lid is off.

All this ought to interest you because Mr. Carson's posting us on political developments in Virginia is, we feel sure, a result of ROCK PRODUCTS' various editorial efforts in attempting to point out the need of a greater interest in politics and in government by business men. Stirred by the efforts of some states to engage in the production of rock products, we have suggested on several occasions that the ultimate blame for these conditions was with the producers themselves for not taking a more active part in the government of our country.

Of course, not all producers have the background of political experience and inheritance of Mr. Carson, but his demonstration of "business in politics" rather than "politics in business" is an inspiration to us all.

Portland Cement Output in September

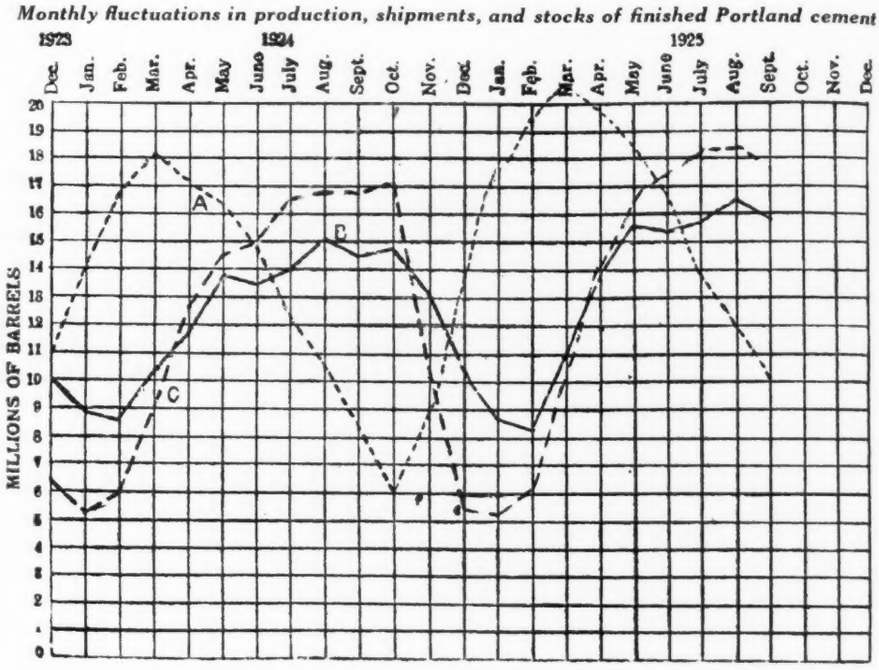
Shipments for Month Total 17,711,000 Barrels

NEW September records were made in both production and shipments of portland cement during the month just closed, according to statistics compiled by the Bureau of Mines, Department of Commerce. Production has been exceeded only by that of August; shipments by two other months only. During the nine months ending September 30 the shipments amounted to 124,311,000 bbl., which exceeded the record volume moved in the corresponding period of 1924 by over 10%. Stocks of portland cement decreased but are over 21% greater than on September 30, 1924. The following tables, prepared by the Division of Mineral Resources and Statistics of the Bureau of Mines, are based mainly on the reports of producers of portland cement. The September, 1925, totals include estimates for two plants.

Clinker Stocks

Stocks of clinker, or unground cement, at the mills at the end of September, 1925, amounted to about 4,572,000 bbl. compared with 5,640,000 bbl. (revised) at the beginning of the month.

Monthly fluctuations in production, shipments, and stocks of finished Portland cement


1923
1924
1925
Dec. Jan. Feb. Mar. Apr. May June July Aug. Sept. Oct. Nov. Dec. Jan. Feb. Mar. Apr. May June July Aug. Sept. Oct. Nov. Dec.
MILLIONS OF BARRELS
0 1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20
A
B
C

(A) Stocks of finished portland cement at factories; (B) Production of finished portland cement; (C) shipments of finished portland cement from factories

PORTLAND CEMENT SHIPPED FROM MILLS INTO STATES, IN JULY AND AUGUST, 1924 AND 1925, IN BARRELS*

Shipped—	July 1924	July 1925	August 1924	August 1925
Alabama	212,720	256,741	185,494	277,605
Alaska	1,432	2,816	1,053	264
Arizona	30,474	37,842	32,615	33,328
Arkansas	129,334	78,059	139,515	88,143
California	942,273	1,061,048	960,221	1,154,523
Colorado	161,005	118,272	174,924	118,335
Connecticut	192,957	176,644	179,012	194,113
Delaware	46,078	43,326	49,501	50,949
District of Columbia	79,851	82,133	80,080	83,155
Florida	173,184	341,849	198,827	310,457
Georgia	107,824	132,050	134,819	136,542
Hawaii	5,451	993	1,842	1,108
Idaho	23,922	28,498	28,042	31,846
Illinois	1,533,330	1,853,734	1,404,542	1,790,148
Indiana	744,692	658,042	781,376	690,624
Iowa	401,855	327,155	357,329	375,407
Kansas	199,437	226,787	228,297	254,074
Kentucky	188,068	229,652	203,792	220,859
Louisiana	109,385	99,111	104,683	105,440
Maine	50,045	41,475	48,807	37,762
Maryland	218,371	247,835	256,498	235,983
Massachusetts	388,173	386,058	369,062	357,825
Michigan	1,205,309	1,229,598	1,252,561	1,194,934
Minnesota	405,863	436,453	392,542	472,018
Mississippi	41,506	67,446	60,512	70,141
Missouri	427,101	683,097	435,736	723,916
Montana	20,985	31,486	26,332	31,638
Nebraska	158,955	203,863	178,020	210,305
Nevada	8,806	10,068	9,847	12,635
New Hampshire	41,240	41,843	46,592	52,941
New Jersey	738,895	760,944	712,602	653,685
New Mexico	22,007	16,323	24,153	17,246
New York	2,041,145	2,170,960	1,966,885	2,156,950
North Carolina	259,730	343,683	383,174	340,027
North Dakota	72,154	55,305	33,148	37,735
Ohio	1,211,851	1,099,016	1,164,939	1,212,138
Oklahoma	177,823	225,729	193,464	286,912
Oregon	140,656	143,672	153,691	157,360
Pennsylvania	1,580,596	1,869,377	1,737,633	1,852,734
Porto Rico	0	0	0	0
Rhode Island	60,649	75,383	63,326	71,900
South Carolina	42,238	75,376	50,890	92,255
South Dakota	70,244	55,487	53,360	57,380
Tennessee	148,173	208,562	176,909	193,279
Texas	388,590	418,401	379,845	404,161
Utah	55,413	38,975	41,539	45,985
Vermont	35,469	26,245	46,512	23,698
Virginia	156,644	180,025	189,686	176,842
Washington	179,521	334,466	208,254	323,325
West Virginia	226,563	164,874	207,811	177,994
Wisconsin	586,677	562,363	551,562	626,004
Wyoming	47,769	25,691	46,597	31,042
Unspecified	66,488	48,647	73,614	3,056
	16,558,921	18,033,478	16,782,067	18,258,726
Foreign countries	55,079	97,522	72,933	124,274
Total shipped from cement plants	16,614,000	18,131,000	16,855,000	18,383,000

*Includes estimated distribution of shipments from three plants in July and August, 1925; from four plants in August, 1924; and from five plants in July, 1924.

DOMESTIC HYDRAULIC CEMENT SHIPPED TO ALASKA, HAWAII, AND PORTO RICO, IN AUGUST, 1925*

	Barrels	Value
Alaska	1,947	$6,296
Hawaii	1,391	3,207
Porto Rico	8,000	18,030
	11,338	$27,533

*Compiled from records of the Bureau of Foreign and Domestic Commerce and subject to revision. †Imports and exports in September, 1925, not available.

IMPORTS AND EXPORTS OF HYDRAULIC CEMENT, BY MONTHS, IN 1924 AND 1925

Month—	Imports 1924 Barrels	Imports 1924 Value	Imports 1925 Barrels	Imports 1925 Value	Exports 1924 Barrels	Exports 1924 Value	Exports 1925 Barrels	Exports 1925 Value
January	153,839	$250,799	229,838	$361,098	88,586	$252,497	71,596	$207,547
February	162,930	219,588	119,077	206,308	62,606	194,110	56,249	181,356
March	160,517	254,745	218,054	374,839	91,224	254,687	65,248	200,410
April	148,137	227,300	197,686	280,826	83,200	229,183	89,508	263,831
May	161,304	232,950	186,897	286,959	88,850	262,290	85,385	250,845
June	196,655	283,112	254,937	409,539	74,064	229,852	71,343	217,899
July	108,944	181,111	335,118	499,602	60,139	186,073	98,141	286,543
August	192,634	305,690	380,568	611,551	85,883	251,904	103,961	289,904
September	138,369	232,991	(†)	(†)	69,470	206,921	(†)	(†)
October	214,987	337,199	.....	.....	79,180	253,479	.....	.....
November	198,806	305,598	.....	.....	42,490	130,519	.....	.....
December	173,814	285,481	.....	.....	52,851	163,639	.....	.....
	2,010,936	$3,116,564	.....	.....	878,543	$2,615,154	.....	.....

EXPORTS OF HYDRAULIC CEMENT BY COUNTRIES IN AUGUST, 1925

Exported to—	Barrels	Value
Canada	1,147	$4,867
Cuba	41,154	98,173
Other West Indies	10,455	26,413
Mexico	10,927	32,876
Central America	12,685	33,963
South America	24,132	75,359
Other countries	3,461	18,253
	103,961	$289,904

Distribution of Cement

The figures on the opposite page show shipments from portland cement mills distributed among the states to which cement was shipped during July and August, 1924 and 1925. The tables below show the statistics from which the graph was platted.

PRODUCTION, SHIPMENTS AND STOCKS OF FINISHED PORTLAND CEMENT, BY DISTRICTS IN SEPTEMBER, 1924 AND 1925, AND STOCKS IN AUGUST, 1925, IN BARRELS

Commercial District:	Production September		Shipments September		Stocks at end of September		Stocks at end of August
	1924	1925	1924	1925	1924	1925	1925*
E'n Penn., N. J. & Md.	3,528,000	3,685,000	4,247,000	4,428,000	1,373,000	1,041,000	1,784,000
New York	765,000	910,000	901,000	1,072,000	553,000	461,000	623,000
Ohio, W'n Penn. & W. Va.	1,628,000	1,620,000	1,752,000	1,905,000	895,000	1,232,000	1,517,000
Michigan	986,000	1,087,000	1,169,000	1,245,000	338,000	716,000	873,000
Wis.†, Ill., Ind. & Ky.	2,128,000	2,403,000	2,825,000	2,697,000	857,000	1,828,000	2,122,000
Va., Tenn., Ala. & Ga.	1,083,000	1,289,000	1,138,000	1,341,000	360,000	262,000	314,000
E'n Mo., Ia., Minn & S. D.‡	1,478,000	1,591,000	1,777,000	1,781,000	1,747,000	1,890,000	2,080,000
W'n Mo., Neb., Kans. & Okla.	1,009,000	1,122,000	1,043,000	1,055,000	1,109,000	1,498,000	1,430,000
Texas	343,000	399,000	380,000	372,000	207,000	288,000	262,000
Colo. & Utah	262,000	215,000	269,000	211,000	184,000	366,000	362,000
California	1,015,000	1,223,000	1,011,000	1,199,000	338,000	414,000	391,000
Ore., Wash. & Mont.	294,000	395,000	315,000	405,000	443,000	184,000	194,000
	14,519,000	15,939,000	16,827,000	17,711,000	8,404,000	10,180,000	11,952,000

*Revised. †Began producing June, 1924. ‡Began producing December, 1924, and shipping January, 1925.

PRODUCTION, SHIPMENTS, AND STOCKS OF FINISHED PORTLAND CEMENT, BY MONTHS, IN 1924 AND 1925, IN BARRELS

Month	Production		Shipments		Stocks at end of month	
	1924	1925	1924	1925	1924	1925
January	8,788,000	8,856,000	5,210,000	5,162,000	14,155,000	17,656,000
February	8,588,000	8,255,000	5,933,000	6,015,000	16,815,000	19,689,000
March	10,370,000	11,034,000	8,995,000	10,279,000	18,189,000	20,469,000
First quarter	27,746,000	28,145,000	20,138,000	21,456,000		
April	11,726,000	13,807,000	12,771,000	14,394,000	17,159,000	19,877,000
May	13,777,000	15,503,000	14,551,000	16,735,000	16,403,000	18,440,000
June	13,538,000	15,387,000	15,036,000	17,501,000	14,903,000	16,409,000
Second quarter	39,041,000	44,697,000	42,358,000	48,630,000		
July	14,029,000	15,641,000	16,614,000	18,131,000	12,319,000	13,896,000
August	15,128,000	16,419,000	16,855,000	18,383,000	10,666,000	*11,952,000
September	14,519,000	15,939,000	16,827,000	17,711,000	8,404,000	10,180,000
Third quarter	43,676,000	47,999,000	50,296,000	54,225,000		
October	14,820,000		17,160,000		6,073,000	
November	13,141,000		10,289,000		8,928,000	
December	10,435,000		5,506,000		13,913,000	
Fourth quarter	38,396,000		32,955,000			
	148,859,000		145,747,000			

*Revised

IMPORTS AND EXPORTS*

IMPORTS OF HYDRAULIC CEMENT BY COUNTRIES, AND BY DISTRICTS, IN AUGUST, 1925

Imported from	District into which imported	Barrels	Value
Belgium	Massachusetts	29,103	$63,391
	Philadelphia	29,793	43,053
	South Carolina	2,270	2,944
	Florida	69,976	120,588
	New Orleans	21,250	31,066
	Los Angeles	43,292	63,691
	San Francisco	3,003	4,025
	Total	198,687	$328,758
Canada	Maine and New Hampshire	1,001	$1,631
	Vermont	14,995	22,019
	Saint Lawrence	25,188	38,972
	Rochester	1,918	2,116
	Buffalo	24,753	38,329
	Florida	14,697	22,072
	Washington	54	148
	Total	82,606	$125,287
Denmark	Porto Rico	30,240	$46,857
France	New York	989	$2,308
Germany	New Orleans	1,716	$1,507
Japan	Hawaii	2,800	$3,756
Norway	Maine and New Hampshire	4,015	$6,376
	Massachusetts	27,523	49,200
	Oregon	11,915	18,792
	Washington	20,077	28,710
	Total	63,530	$103,078
	Grand total	380,568	$611,551

*Compiled from records of the Bureau of Foreign and Domestic Commerce and subject to revision.

Pittsburgh Plate Glass Company to Double Capacity of Its Cement Plant

THE Pittsburgh Plate Glass Co., Pittsburgh, Penn., is arranging for the erection of an addition to the plant of the Columbia Chemical Division, Fultonham, near Zanesville, Ohio, a subsidiary, to increase the capacity to about 5000 bbl. per day, or double the present output. The expansion is estimated to cost $1,500,000, with machinery. The original plant was completed in June, 1924, and was described in detail in ROCK PRODUCTS, May 3, 1924, issue.

Ann Arbor Fellowships in Highway Engineering

THE University of Michigan fellowships in highway engineering for the current year include two offered by rock products manufacturers. The donors are the United Fuel and Supply Co. of Detroit, Mich., and the National Slag Association of Cleveland, Ohio. L. E. Williams, manager, sand and gravel plants of the United Fuel and Supply Co., and Frederick Hubbard, research engineer of the Standard Slag Co., have been appointed non-resident lecturers for the years 1925-1926.

Duluth Rejects Bid for Quarrying Work

BIDS for the removal of rock from the cliffs which run along both sides of the road between the eastern and western parts of Duluth, Minn., were rejected as too high by commission of public utilities. The city engineer's estimate was $3 per cu. yd., but it was contended that even this was too high. Two bids were received for the work, one of $4.75 per cu. yd. and another from the Duluth Crushed Stone Co. of $10,000 for removal of any quantity up to 3000 yd. and for excess of that $3.50 per yd.

In a statement included in their bid, F. A. Brewer, president of the Duluth Crushed Stone Co., said that the proposed project was a very expensive quarrying operation, because the rock is badly cracked and seamed and pieces would be thrown a long distance in blasting, also that there were several large blocks of rock hanging loosely to the side of the cliff and they would be dislodged when charges were exploded nearby.

In their bid the company proposed to dump the dislodged rock into a quarry on the point a short distance east of the project.

Removal of rock from the cliffs is a matter of public safety, for several large blocks are apt to be dislodged during the freezing and thawing in the winter and not only cause possible damage but in falling to the road would block traffic for an indefinite period. —*Duluth (Minn.) Herald.*

Cement Anti-Trust Case Ends

ACTION of the supreme court recently in denying a hearing to the government in the case against the Cement Manufacturers' Protective Association brought to an end the federal effort to characterize exchange of trade statistics among members of industrial organizations as a violation of the Sherman anti-trust act.

The decision is regarded as ending litigation over a long drawn out controversy and marking a victory for Secretary of Commerce Hoover, who has been fighting with the trade associations for recognition of the legality of certain statistical exchanges which were held not to affect prices.

The supreme court decided last June against the government's contention that exchanges of statistics were a violation of the law. The government asked for a rehearing, which was denied today.

John W. Davis of New York, who argued the case for the association issued the following statement regarding the significance of the court's action:

"The refusal of the United States supreme court to grant a rehearing in the case of the United States vs. the Cement Manufacturers' Protective Association, brings to conclusion the government's efforts to have certain activities of that association declared to be contrary to the provisions of the Sherman anti-trust law.

"The opinion of the court, rendered last June, which held the practices to which the government objected to be legal and not constituting a restraint of trade, thus becomes the final determination of the case. Of all the charges made, the lower court disapproved only of the exchange of statistics which it thought permitted control of production and so affected prices. Its decree was based on that conclusion.

"The United States supreme court reversed this opinion by recognizing that statistical knowledge is a legitimate part of an industry's economic existence. Thus the cement industry, after years of unjustified charges, is freed of illegal intent. The opinion of the court speaks for itself and leaves no room for any further criticism."—*Chicago Journal of Commerce.*

Idaho Marble Company to Rebuild Plant at Agatha

THE Idaho Marble Co., Lewiston, Idaho, will rebuild its plant recently destroyed by fire at Agatha, Idaho. *(Reported August 22 issue.)* H. J. Kressly, secretary-treasurer of the company, in his letter to the editor stated that although a Washington city made a favorable proposition to have the company locate there, the extensive business built up by them in stucco dash, chicken grits, fertilizer dust for coal mines, etc., would not make it profitable to abandon their present location. The company carries on large dolomite quarry operations. The rebuilt plant will be larger and have additional modern machinery.

Tidewater Portland Bought by North American Cement Corporation

THE North American Cement Corp., which recently acquired the properties and assets of the Security Cement and Lime Co. with plants at Hagerstown, Md., and Berkeley, W. Va., has purchased, subject to the approval of the court, the property of the Tidewater Portland Cement Co. at Union Bridge, Carroll county, Md., and the assets in the hands of the receivers. The deal involves the payment in cash of nearly $3,000,000. Holders of the company's first mortgage 6% bonds are given the option of receiving payment in preferred stock of the purchasing company at 92.—*Chicago Journal of Commerce.*

The company has outstanding $1,750,000 first mortgage bonds and $680,000 6% notes; also two note issues of $75,000 and $105,000, respectively.

A Veteran Rock Products Builder

GEORGE W. PATNOE is probably known to as many quarry men in the Middle West as any man in the rock products fraternity. He recently wrote us a very interesting letter from Saltville, W. Va., where he is engineer and manager of quarries for the Mathieson Alkali Works. He is engaged in designing and building what bids fair to be "the last word" in rock-crushing plants. The plant will have a capacity of 250 tons per hour, electrically operated throughout, including shovels and well drills.

Geo. W. Patnoe

Mr. Patnoe has been in the quarry business since 1882. He has been connected with the building of many of the largest crushing plants, including the Dolese and Shepard Co. plant near Chicago. Recently he was with the National Lime and Stone Co., Carey, Ohio.

The Saltville plant will have special 10-ton quarry cars, a special crusher feeder, a 48x60 Traylor jaw crusher, a stone-washing plant and many interesting features. It is expected to be in operation about January 1, 1926.

Governor-General Wood Urges Philippine Government to Sell Cement Plant

GOV.-GEN. LEONARD WOOD strongly favors the sale of the Government-owned portland cement plant at Cebu to private interests, on the ground that it is a losing enterprise and that the additional $1,400,000 asked by the company's directors cannot be made available either by the Insular Government or by the National Development Co., a government organization.

In a message to the legislature the governor general said it was his understanding that government participation in the cement works had been intended as a pioneer venture, and "not with a view to the government's permanently owning and operating such companies as the National Development Co. might create."—*N. Y. Journal of Commerce.*

Pacific Coast Sand and Gravel Operators Oppose Proposed Freight Increase

ASSERTING the proposed increase in railroad freight rates on building materials would seriously hamper consumers as well as the building industry, the Southern California group of the Pacific Coast Sand and Gravel Association, at its recent meeting at the Jonathan Club, strongly opposed the measure.

George A. Rogers, of the Union Rock Co., said that the proposed increase of 7½ cents per ton would advance the retail price more than 50%.—*Illustrated Daily News.*

Florida To Have Another Lime-Rock Plant

NEWSOME BROS. Co. have let the contract for the machinery for a lime-rock plant at Williston, Fla., to Maddox Foundry Co., of Archer, Fla.

This plant will be operated by the firm known as Newsome-Smith Lime Rock Co. composed of L. S. Newsome, J. G. Newsome and O. O. Smith.

The plant will have capacity of twenty cars per day and will be put in at once.

This makes four plants that are being erected here now in addition to those that are already in operation.—*Williston (Fla.) Sun.*

Cement Products

TRADE MARK REGISTERED WITH U. S. PATENT OFFICE

Lighting Standards as Cement Products

Progressive Communities Almost Everywhere Find the Concrete Superior in Beauty and Low Maintenance

By A. J. R. Curtis

FEW CEMENT PRODUCTS of any kind have come into general popularity more quickly than have concrete lighting standards. Modern street illumination demands poles which beautify rather than disfigure the street during the day; the concrete lighting standard, in any of some 40 popular designs, meets this requirement. As much cannot be said for competing metal or wooden poles. Concrete poles practically eliminate maintenance cost—including expensive painting. Concrete pole surfaces do not retain dust, dirt, or soot.

The many inherent advantages of the concrete lighting standard explain its extensive use wherever an attractive and economical lighting system is required for business thoroughfares or for fine residential streets, where ordinary light poles so frequently prove a blemish to otherwise beautiful surroundings. This last statement applies particularly to park and boulevard requirements, for which concrete poles are admirably adapted.

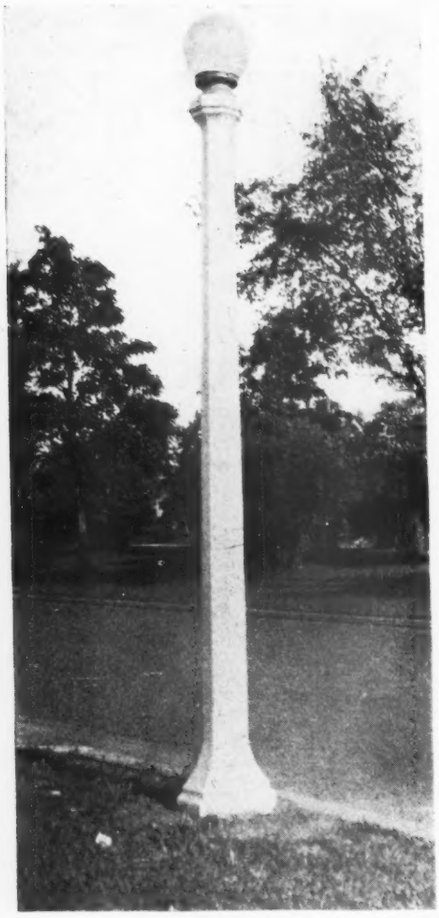
It is customary to design concrete standards amply strong for all ordinary requirements, using for this purpose a fabricated bundle of reinforcing rods. Breakage from such causes as truck collisions is not provided against in concrete poles for most purposes, since these accidents occur only infrequently, making replacement much more economical than the additional cost of reinforcing. However, concrete standards show remarkable records for resistance to the extreme shock of heavy accident impacts and in this respect are conceded to be superior to other types.

Details of Design

Concrete lighting standards are generally made in heights ranging from 7 to 15 ft., except where a greater height may be required for city downtown lighting or other special installations. The greater number of poles in general use are octagonal or round in shape, and while simpler sections are usually preferred, fluted columns and other more ornamental designs are frequently used. Each of the larger manufacturers has tried to give his own design a certain amount of individuality by varying dimensions slightly. The better designs taper somewhat from base to head, lending them a graceful appearance. While a base of ample size is necessary for proper setting and for protection, the head need be no larger than required for properly securing the metal light holder and globe. The foundations are sometimes cast monolithic with the base, while in other types reinforcing bars are permitted to extend 3 or 4 ft. below the base of the finished standard to allow for anchorage in the concrete foundation. A number of popular designs are shown in the accompanying illustrations. Obviously these are merely a typical assortment of the many designs now in use.

A typical lighting standard—a cement product

For ordinary street lighting a single globe is usually carried, although for sidewalk and store-front lighting on business streets separately or integrally cast crossarms are often used to support four or five globes. A variety of surface finishes are obtainable through the use of special colored and graded



A St. Paul, Minn., cement lighting standard

aggregates which are exposed by acid treatment following removal from the molds.

Steel or Cast Iron Molds Used

Steel or cast-iron molds are required for producing lighting standards on a commercial scale. Where only four or five standards are needed for some special installation, wooden molds may be employed.

Steel and iron molds are carefully constructed so that the sections can be easily and securely locked together, and accurately machined so that joint marks will not appear on the finished standards. Shackles or other devices are generally provided to permit convenient handling of the molds on cars or by crane.

Assembling the Molds and Reinforcement

Low wooden horses are usually provided for convenience in cleaning the molds and assembling and inserting the reinforcement. A small overhead crane or an industrial car equipment is necessary to handle molds and standards in a factory with even a moderate output. The molds are usually cleaned with heavy wire brushes and oiled with a light coating of kerosene and paraffin, or some similar non-staining mixture, to prevent the concrete from adhering to the forms.

From four to eight reinforcing bars running the length of the standards are used, the number depending upon the size and shape of the posts. Reinforcement is so spaced that the rods at no place come closer than ¾-in. to the surface of the concrete. Reinforcement for the standard is assembled in a rigidly wired frame provided with spacers to prevent movement of the bars while the concrete is being placed.

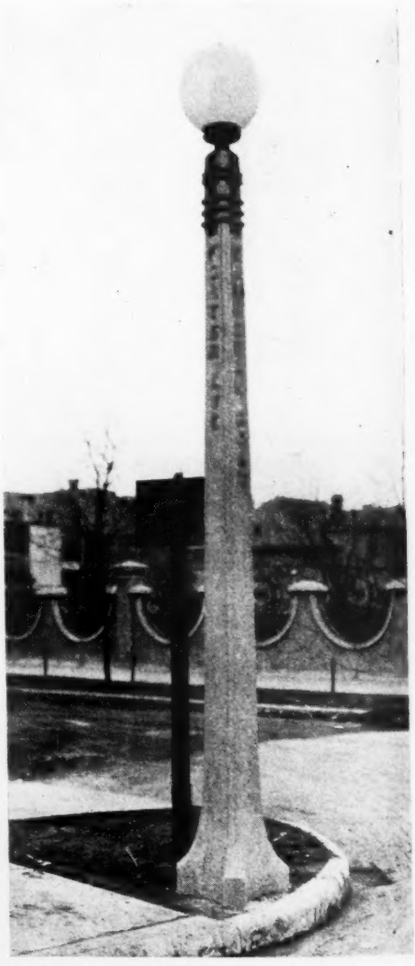
Conduit for electric wiring is provided by passing 1½ or 2-in. gas pipes up the center of the pole. The assembled reinforcement is often attached to the pipe to hold the bars in place while the concrete is being deposited. The top of the gas pipe is usually threaded to provide convenient attachment for the lighting fixtures.

Placing the Concrete

Since standards are larger at the base than at the head, it is customary to cast them butt end up. Practically every factory has devised its own system for holding molds in place during the casting operation. Long standards are sometimes cast in a horizontal position, the upper side of the forms having an opening through which the concrete is placed.

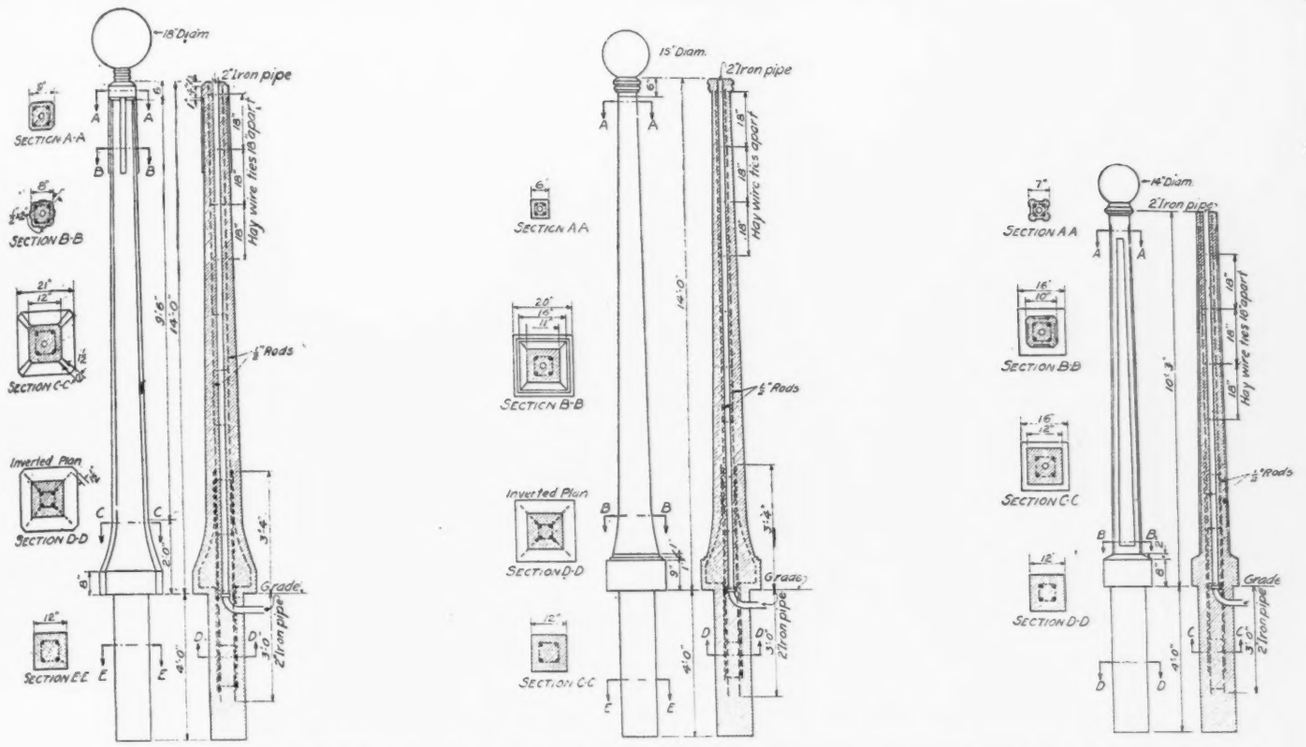
Proportions of cement to aggregate are the same throughout the post, the exact mixture needed to obtain the desired surface effect being determined through experiment. One of the most important factors involved in the production of a first-class post is the determination of the proper amount of water to use in the mixture. No absolute rule can be given for the exact amount of water needed, as it depends to a large extent upon the size, grading and kind of aggregates used. A little experience, however, will determine the quantity of water which will give best results.

Often the mixer is placed on the second floor and the concrete discharged directly into the molds through small chutes. One company, manufacturing several heights of standards, mixes on the ground floor and uses bucket elevators to convey the concrete into hoppers conveniently placed for the different lengths of standards made.



Chicago, Ill., lighting standard and street-sign post—in use for over 15 years

American Concrete Products Co. plant at Forest Park, a suburb of Chicago, where lighting standards are made



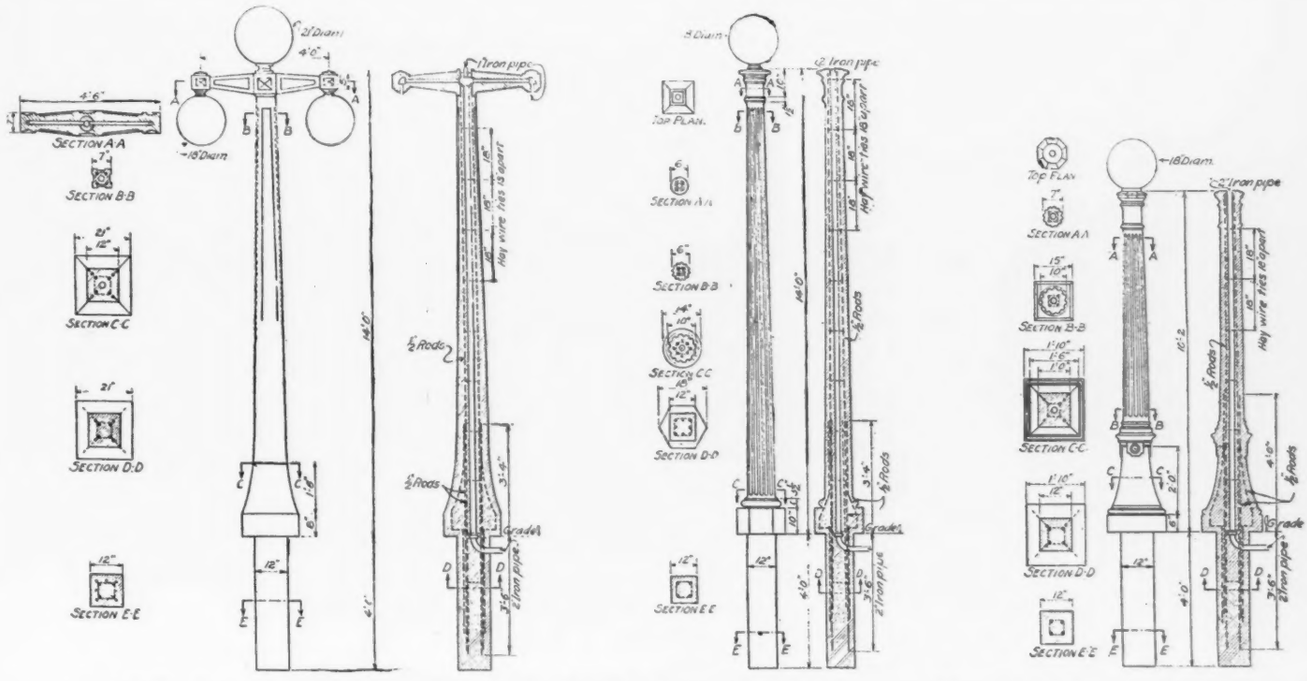
Details of a street-lighting stnadard made of portland cement and aggregate with steel reinforcement

During the time the mold is being filled and for several minutes after, the platform upon which the mold rests is jigged and the concrete consolidated. The jig is commonly operated by a small motor housed below the floor.

One of the largest manufacturers makes concrete lighting standards by a process known as the "centrifugal" method. This method consists of placing the concrete in tubular steel molds in which the reinforcement has been carefully assembled and then rotating the molds at a high rate of speed. The centrifugal action compacts the concrete very efficiently, producing smooth surfaces and leaving a cylindrical opening extending the length of the pole.

Initial Curing and Acid Washing

The molds are moved into a steam curing chamber immediately after vibrating and filling. In warm weather, the standards are permitted to harden on a rack outside the chamber. About 24 hours after the concrete has been placed the molds are removed and the standards are brushed down with a muriatic acid solution. Immediately following the acid treatment the standards are thoroughly washed with water to remove all traces of acid so that a uniform surface



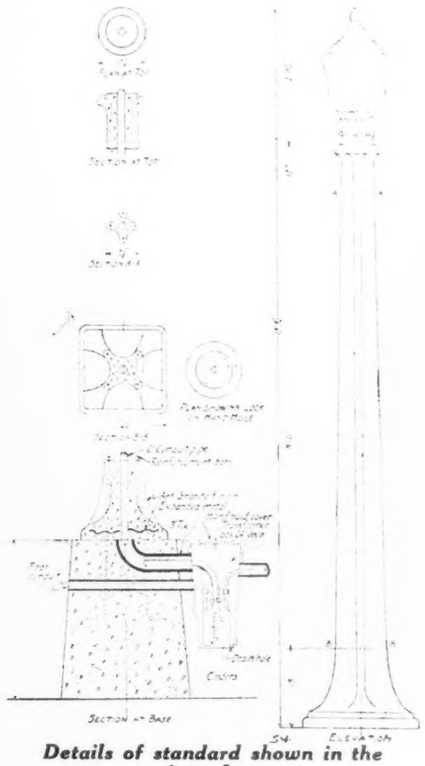
Details of a street-lighting standard made of portland cement and aggregate with steel reinforcement

Plant of the American Concrete Products Co.

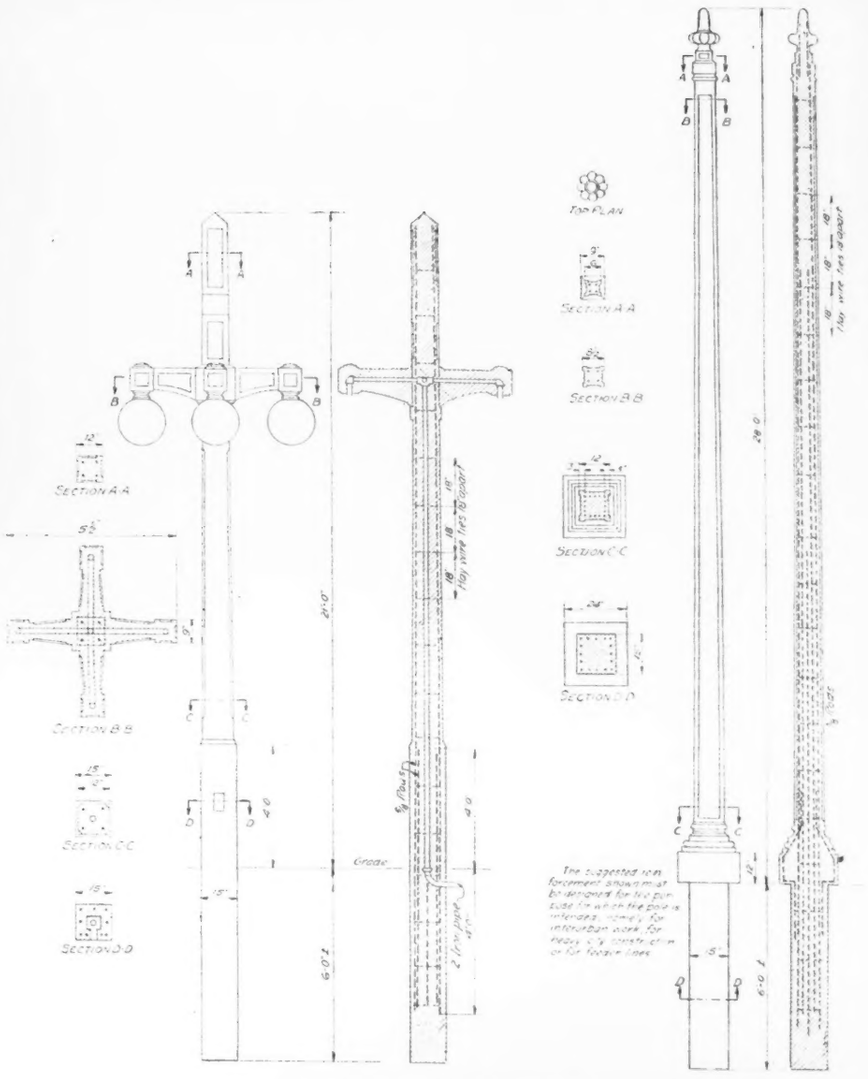
effect can be obtained, free from objectionable stains.

Final Curing, Storing and Crating

Following the acid treatment, it is common practice to place the poles on racks where they are sprinkled for several days, water being supplied through sprays attached to pipes hung overhead. A ¾-in. water pipe provided with small holes at frequent intervals along its length is suitable for this purpose. It is customary to build the curing racks over a concrete floor that slopes to a drain.



Details of standard shown in the view above

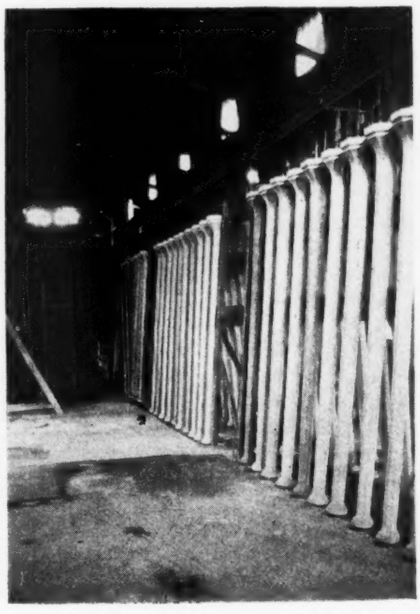


A four-light standard—details

After several days curing, during which the standards are kept constantly moist by the use of the sprinkling system, the standards are moved to the storage yard, where practical standards should be stored under cover for protection against the elements. All standards should be carefully crated for shipping, the bases and heads particularly being carefully wrapped in excelsior or paper to afford maximum protection during transportation.

Many Examples in Evidence

Examples of the durability and charm of concrete lighting standards are everywhere in evidence. An interesting installation is that of the Lincoln Park District of Chicago where concrete lighting standards have been in service for 18 years. H. V. Mulbach, chief engineer of the Lincoln Park Board, gives his endorsement to the Lincoln Park standards in these words: "If these posts were to be examined at the present time, it would be found that there are no check



Plant of the American Concrete Products Co.

markings, spalling or other deteriorating defects . . . there should be absolutely no question as to their durability."

Similar testimonials from other city officials attest to the durability and satisfactory service rendered by concrete lighting standards over a long period of years.

The following are a few of the cities which have already installed concrete standards: Columbus, Ohio, Dallas, Texas, Pasadena, Calif., Milwaukee, Wis., Terre Haute, Ind., Mason City, Iowa, Oklahoma City, Okla., Maywood, Ill., Rochester, N. Y., Riverside, Calif., Newark, Ohio, Bangor, Maine, San Bernardino, Calif., Richmond, Ind., St. Mary's Falls' Canal, Mich., San Francisco, Calif., Houston, Texas, and Chicago, Ill.

Northern Concrete Brick Works

THE Northern Concrete Brick Works is situated in Germantown, a historic old portion of Philadelphia, Penn., in which a great deal of new building is now being carried on. The plant makes only brick, except for a little trim stone which is made of white cement and sand and poured by hand.

The owners of the plant formerly operated a stone quarry near the site of the plant and the building was put up of stone from the quarry. An addition was later made of the overhead bins which hold the aggregate.

The aggregate employed is mainly crushed slag, although some cinders are used. These are mixed with sand from New Jersey. The aggregates are received in a yard at the rear of the plant and taken in wheelbarrows to the boot of an elevator which lifts them to the overhead bins.

The aggregates are drawn by gravity to the mixer which is below the bins. No measurement is made, the operator being able from long practice to judge the right proportions. The superintendent makes occasional tests to see that the mixture is correct.

One Besser automatic brick machine is used. It makes eight bricks at each stroke and the production averages 50,000 brick a day of 10 hours.

Three men are employed at the machine; one takes the pallet with eight brick from the machine and passes it back to two other men, who place it on the truck by which the brick are taken to the steam curing room. These men change places as soon as a truck has been filled, for the man who takes the brick from the machine and also places the pallet in position has the hardest part of the job. A helper wheels the trucks to the steam curing room and keeps the machine supplied with pallets.

The trucks run on the usual system of parallel tracks with a transfer truck for shifting the loaded trucks from one track to another.

At the time the plant was visited there was a great demand for bricks and the plant was producing and delivering them as fast as possible. Bricks were being taken from the steam curing room after 24 hours' curing and loaded on to trucks for delivery. In order to do this the company has made something of a study of different cements and aggregates to find the mix that would harden most quickly. Curing of course will go on in the wall as well as in a stockpile, so the method is quite safe provided that the bricks are hard enough to stand shipping and handling before they are laid.

A. T. Nolan is manager of the plant and John G. Kriss is superintendent in charge of operations.

Ohio Building Code Revised

AN eight-page pamphlet announcing the amendments to the Ohio State Building Code contains the text of these amendments in so far as they relate to the use of concrete masonry together with a discussion of the characteristics and advantages of concrete masonry as a building material. Other information of importance to architects, structural engineers, contractors and building owners is also given.

Copy of this folder may be obtained by writing to the Ohio Concrete Products Association, 530 Dublin avenue, Columbus, Ohio, or The Portland Cement Association, 16 East Broad street, Columbus, Ohio.

One Way of Selling Concrete Blocks

BUY a lot. Erect a house or factory on it of concrete block made at the lot. Sell the building and move the concrete block machinery to another lot and repeat the process. That's the method used by Alspaugh and Thurston & Co. of Glendale, Calif. According to the *Oxnard (Calif.) Gazette*, the structure erected serves as a sample of their work and demonstrates the practical use of a new concrete block made by the company.

Lowell New Vice-President of Benedict Stone Company

THE Benedict Stone Co. of Chicago announced recently the appointment of John W. Lowell of Chicago as vice-president. Mr. Lowell had been connected with the Universal Portland Cement Co. lately serving as assistant manager of the service bureau of the company.

The Benedict Stone Co. is a pioneer in the manufacture of artificial stone made from white dolomite and portland cement. This stone has found a wide variety of use and is a strong competitor of natural cut stone. Complete description of the Tuckahoe, N. Y., plant of the company was published in Rock Products, March 26, 1921, issue. Recent construction on which their product has been used is the Grant Stadium in Chicago. The company is affiliated with the Benedict Stone Co. of New York and the Canadian Benedict Stone Co., Ltd., of Montreal.

Quarries Exhibit at Made-In-Carolinas Exposition

AT the Made-in-Carolinas Exposition this year the Department of Conservation and Development has had as an exhibit designed peculiarly to show state resources in the particulars of shales and stone.

The Charlotte Crushed Stone Co., Maland-Drysdale Co., of Hendersonville, Ball Mountain Quarries, Harris Granite Co., of Salisbury, N. C., are among the exhibitors.

Concrete brick plant of the Northern Concrete Brick Works, Germantown, Penn.

Traffic and Transportation

By EDWIN BROOKER, Consulting Transportation and Traffic Expert
Munsey Building, Washington, D. C.

Proposed Changes in Rates

THE following are the latest proposed changes in freight rates up to the week beginning October 14:

Southern Freight Association Docket

22997. Sand and gravel. Carloads, subject to present description and minimum weight from Estill Springs, Tenn., to Humboldt, Carroll and Gilmore, Tenn. Present rate, $2.25 per net ton (Jackson combination); proposed rate, $1.76 per net ton, which is the Georgia proposed scale for the distance.

22978. Ground or pulverized limestone or marble. Carloads, minimum weight marked capacity of car, except when car is loaded to full visible capacity, actual weight will apply, from Sparta, Tenn., to Filbert and Clover, S. C. Lowest combination now applies. Proposed, $2.70 per net ton, same as the present rate to Chester, S. C.

23030. Stone. As described in Item 730, page 111, Agent Speiden's I.C.C. 883, from Cincinnati, Ohio, and New Albany, Ind., applicable only on traffic originating at points in Indiana shown in Note 1, page 202, of tariff named, to South Lexington, N. C. Present rate, 33½ cents; proposed, 24 cents per 100 lb., same as rate in effect to Lexington, N. C., proper.

23049. Granite or stone, rough quarried or sawed, packed or not packed, hammered or chiseled; also sand rubbed (or slushed), boxed or crated, or with finished surfaces protected by boxing or crating. Less than carloads from Balfour, Bear Poplar, Charlotte, Granite Quarry, Greensboro, Mt. Airy, Salisbury and Winston-Salem, N. C., to Tampa, Fla. Present rate, 80½ cents; proposed, 73½ cents per 100 lb., based 7 cents higher than rate in effect from Columbia, S. C.

23050. Pulverized soapstone (asphalt filler and surfacer). Carloads, minimum weight 90% of marked capacity of car, but not less than 67,000 lb. from Rockfish, Va. (when from stations on the Nelson & Albemarle railway), to Jacksonville, Fla. Present rate, 65 cents per 100 lb. (6th class); proposed, $2.43 per net ton, which represents the Southern railway single line scale on limestone (I.C.C. A-9956) extended to 655 miles.

23069. Lime (calcium), acetate or dry, in bags or barrels. Carloads, minimum weight 60,000 lb., except when cars are loaded to full visible capacity actual weight will apply, but in no case will the minimum be less than 50,000 lb., from Lyle, Tenn., Kensington, Ill. Present rate, 47½ cents; proposed, 32 cents per 100 lb., same as in effect from Memphis, Tenn.

23070. Bituminous rock. Carloads, usual description and carload minimum weight, from Garfield, Ky., to Madisonville, Ky. Lowest combination now applies. Proposed, $1.63 per net ton (intrastate only), made with relation to rates in effect from other points of production in Kentucky.

23073. Cement. It is proposed to revise the present rates on cement, carloads, minimum weight 50,000 lb., from Chattanooga, Nashville and Richard City, Tenn., to I. C. railroad stations in Kentucky, to conform to the Fourth Section. Both advances and reductions are involved. Statement of present and proposed rates will be furnished upon request.

23090. Bituminous rock. It is proposed to establish rates on bituminous rock, carloads, from Bowling Green and Epleys, Ky., to stations on the E. I. & T. H. railway, made the same as to parallel stations on the C. & E. I. to apply in lieu of combination rates.

23092. Stone, broken or crushed. Carloads, minimum weight 90% of marked capacity of car except when cars are loaded to their visible capacity actual weight will govern. Stone, agricultural (ground limestone). Carloads, minimum weight 60,000 lb., from Palmyra and McKinnon, Tenn., to L. & N. railroad Memphis line stations. Class rates now apply and it is proposed to establish rates the same as in effect from Willock, Tenn., or Hopkinsville, Ky.

23142. Limestone or marble, ground or pulverized. Carloads, minimum weight marked capacity of car, except when cars are loaded to their full visible capacity, actual weight will apply, from Ladds, Ga., to New Orleans, La. Present rate, $2.61; proposed, $2.34 per net ton, same as present rate from Mascot, Tenn.

23154. Stone, rough quarried (will not apply on sawed, sand rubbed [slushed], slabs, blocks or columns, floor, tiling or building stone for exterior of buildings). Carloads, minimum weight 30,000 lb. from Louisville, Ky., to Bowling Green, Ky. Present rate, 12½ cents; proposed, 8 cents per 100 lb., made in line with rates in effect between other points on the L. & N. railroad.

23164. Limestone, ground, powdered or pulverized. Carloads, minimum weight 60,000 lb. Stone, crushed or rubble. Carloads, minimum weight marked capacity of car, except when cars are loaded to their visible capacity actual weight will govern, from Ladds, Ga., to Toumey, S. C. Combination now applies. Proposed, same as present rate to Sumter, S. C., i.e., $2.37 per net ton.

23177. Sand. Carloads, minimum weight 90% of marked capacity of car, except when cars are loaded to their visible capacity, actual weight will govern, from Alabama Ctiy, Attalla and Gadsden, Ala., to Knoxville, Tenn. Present rate, 11½ cents per 100 lb.; proposed, $1.49 per net ton based on the carriers' proposed Georgia scale, less 10%.

23210. Stone, viz.: Rough quarried blocks, rough sawed, sand rubbed (slushed) slabs, blocks, columns, floor tiling, building stone such as used for exterior of buildings. Carloads, minimum weight 30,000 lb., from New Albany, Ind., and Cincinnati, Ohio (applicable only on traffic originating in the Bedford, Ind., district), to Wilmington, N. C. Present rates from Cincinnati and New Albany, 35½ cents; proposed, from New Albany, 29 cents; from Cincinnati, 26 cents per 100 lb. The proportional rates suggested are necessary to equalize the New Albany-Columbia, S. C., combination and the proportional rates from New Albany and Cincinnati are suggested so that the lowest available combination can be protected via available routes and not to be confined to routes which carry the traffic through Columbia, S. C.

23231. Crushed stone. Carloads, minimum weight 60,000 lbs., from Whitestone, Ga., and marble, crushed in bags, carloads, minimum weight capacity of car, and marble, ground or pulverized in bags, carloads, minimum weight, capacity of car, from Tate, Ga., to McComb, Ill. Combination rates now apply. Proposed on crushed stone, from Whitestone, 47 cents; on crushed marble from Tate, $4.47, and on marble, ground or pulverized from Tate, $4.72 per net ton. Proposed rates are made by use of proportional rate and $2.50 per net ton on ground or pulverized marble from Whitestone and Tate to Cincinnati and proportion of $2.22 beyond acceptable to northern lines.

23236. Crushed stone. Carloads, minimum weight 60,000 lb., from Whitestone, Ga., and on crushed marble, carloads, minimum weight capacity of car and ground or pulverized marble, carloads, minimum weight capacity of car, from Tate, Ga., to Huntingburg, Ind. Combination rates now apply. Proposed, on crushed stone from Whitestone, $3.29; on crushed marble from Tate, $3.29, and on ground or pulverized marble from Tate, $3.76 per net ton. Proposed rates are based by use of proportional rate of $2.25 on crushed stone and marble and $2.50 per ton on pulverized or ground marble from Whitestone and Tate to Louisville, Ky., and proportion contributed by Southern railway beyond.

Southwestern Freight Bureau Docket

6075. Granite from Columbia, S. C., to Parsons, Kan. To establish a rate of $7.92 per net ton on granite or stone, rough quarried, carloads, minimum weight 40,000 lb., from Columbia, S. C., to Parsons, Kan. It is contended that present basis, which is combination of locals is too high to permit of movement.

New England Freight Association Docket

8969. Granite, rough quarried or sawed, four sides or less (not carved, lettered, polished or traced) and granite curbing or paving. Minimum weight 50,000 lb. from West Chelmsburg, Pa., 24. Reason: To place these two points on a basis comparable with other Boston & Maine railroad shipping points.

8984. Lime. Minimum weight 40,000 lb., from Fonda Junction, Highgate Springs, Swanto and Winooski, Vt., to N. Y. C. railroad stations: Harlem Division: Ghent, N. Y., to Melrose Junction, N. Y., inclusive, Putnam Division: Putnam Junction to High Bridge, N. Y., inclusive. 18. Reason: To take care of new business in the destination territory involved.

9008. Granite, marble or stone (other than bituminous asphalt rock), artificial or natural, except carved, lettered or traced. From East Weymouth, Mass., to Irvington, N. J.; when polished, 27; other than polished, 24. Reason: Establishment of proposed rate will, it is believed, promote a movement.

Trunk Line Association Docket

12767. To increase rates on lime, carloads, minimum weight per official classification from Syracuse and Utica, N. Y., to:

	Cents
Wilkes-Barre to Centre Village, N. Y., incl.	17½
Port Crane to Elsemere, N. Y., incl.	14½
Lansingburg, N. Y.	16
West Waterford to Mechanicsville, N. Y., incl.	16
Portlandville to Cooperstown, N. Y., incl.	16

Reason for this proposal: To place rates on a parity with the New York Central railroad.

Western Trunk Line Docket

4872. Stone, building or paving, rough or dressed (not carved, lettered or polished), from Wausau, Wis., to Des Moines, Iowa. Rate: Present, class E, 20½ cents; proposed, 17 cents. Minimum weight 36,000 lb.

4896. Gypsum rock. From Centerville, Iowa, to Buffington, Ind. Present, 14½ cents per 100 lb.; proposed, 12½ cents per 100 lb. Minimum weight 90% marked capacity of car.

4897. Stone, crushed. Carloads, from Maysville, Wis., to Des Moines, Iowa. Present, 18½ cents per 100 lb. (interstate distance rate); proposed, 13½ cents per 100 lb. Minimum weight 90% of marked capacity of car, except that when weight of shipment loaded to full visible capacity of car is less than 90% of marked capacity of car actual weight will apply, but in no case shall the minimum weight be less than 40,000 lb.

Central Freight Association Docket

11660. Agricultural limestone. Hillsvale, Walford, Pa., to Margaret Mine, Numine and Yatesboro, Pa. Present rate, no commodity rate in effect; proposed, 93 cents.

11661. Crushed stone, gravel and sand, except blast, core, engine, filter, fire or furnace, foundry, glass, grinding or polishing, loam, moulding or silica. Kenneth and Lake Ciecott, Ind., to Verona, Ind. Present rate, 70 cents per net ton; proposed, 60 cents per net ton.

11668. Crushed stone. White Sulphur, Ohio, to Ravenna, Ohio. Present rate, 6th class; proposed, $1.10 per net ton.

11669. Crushed stone. Liberty, Ohio, to Black Lick, Summit and Pataskala, Ohio. Proposed, 80 cents per net ton.

11677. Molding sand. Oscoda, Mich., to Detroit, Mich. Present rate, 6th class, 21½ cents; proposed, $1.75 per net ton.

11690. Core sand. Allegan, Mich., to South Haven, Mich. Present rate, 14c; proposed, $1.13 per net ton.

11714. Crushed stone. Piqua, Ohio, to Mt. Oreb, Ohio. Present rate, $1.20 per net ton; proposed, $1.10 per net ton.

11715. Crushed stone. Piqua, Ohio, to Xenia, Ohio. Present rate, 70 cents per net ton; proposed, 60 cents per net ton.

11716. Crushed stone. Sandusky, Ohio, to Phalanx, Leavittsburgh, Braceville, Windham and Freedom, Ohio. Present rate, $1.20 per net ton; proposed, $1.10 per net ton.

Illinois Freight Association Docket

562-A. Gravel, sand, strippings, sand pit, strippings, gravel pit. Minimum weight, 90% of the marked capacity of car, except actual weight will govern where car is loaded to full visible capacity, but not less than 40,000 lb., from Beloit and Janesville, Wis., and South Beloit, Ill., to Whitton, Ill. Proposed to cancel present commodity rate of $1.67 per net ton.

1301-A. Sand. Carloads, minimum weight 90% of the marked capacity of car, except that when cars are loaded to full visible or cubical capacity, actual weight will apply, but not less than 40,000 lb.

(Rates in cents per net ton)

From Keokuk, Iowa, to:

	Present	Proposed
Carthage, Ill.	88	76
Elvaston, Ill.	70	70
Mt. Sterling, Ill.	88	88
Jacksonville, Ill.	112	88
Meredosia, Ill.	98	88
Springfield, Ill.	126	101

Oklahoma Cement Transit Case

THE Interstate Commerce Commission, in a report on No. 16640, Limestone Into and Cement Out of Ada, Okla., mimeographed, has found the St. Louis-San Francisco tariffs I. C. C. Nos. 8140 and 8474, purporting to accord transit, at Ada, under which crushed limestone and shale originating at Lawrence and Lantry, Okla., may be manufactured into cement and shipped beyond, over the company's lines to interstate destinations, at lower through charges than when moving beyond, over competitive lines, to be vague, indefinite, contradictory, and therefore unreasonable and unlawful. It ordered the cancellation of the tariffs in so far as they were applicable to interstate traffic, with an observation that it expected the respondent would see that no unjust or unlawful discrimination was practiced as between state and interstate commerce.

The formal docket case was instituted by the commission to inquire into the lawfulness and propriety of the St. Louis-San Francisco tariff I. C. C. No. 8410 which was the first publication purporting to grant transit privilege. A few days prior to the hearing in the formal docket case, the commission said, the Frisco filed the other tariff involved. It was suspended in I. and S. No. 2367. The two cases are covered by this one report, the report being attributed to the whole commission and not to any division thereof. The facts, other than those already set forth and the commission's handling thereof, are as follows:

Lawrence and Lantry are local stations on the Frisco about six miles south of Ada, a point served by the Atoka and by the Atchison, Topeka & Santa Fe, hereinafter termed the Santa Fe, as well as the Frisco.

The Oklahoma Portland Cement Co. operates a plant at Ada. It obtains limerock or shale used in the manufacture of cement at Lawrence and Lantry.

The cement company discovered the stone deposit at Lawrence in 1906. Lawrence was then only a railroad station, and the nearest town was Ada. This fact, and the further fact that the Frisco was agreeable to entering into a contract relating to the movement of the rock from Lawrence to Ada, had a direct bearing upon the selection of Ada, instead of Lawrence, as the site for the cement company's plant.

Under the terms of the contract executed in 1906, the Frisco agreed to haul the rock from Lawrence to Ada at a rate of 8 cents when loaded in cars of the cement company, and 10 cents when loaded in carrier cars, minimum in either case the marked capacity of the car; and the cement company agreed to ship the products of its plant over the Frisco, provided the rates were no higher than over competitive lines.

Apparently most of the traffic has always moved in carrier equipment. On June 25, 1918, the rate on rock loaded in such equipment from Lawrence and Lantry to Ada became 30 cents. On August 26, 1920, it was further increased to 43 cents. Subsequently this rate was made the subject of a complaint before the Corporation Commission of Oklahoma. The Frisco, being dissatisfied with the decision of the Oklahoma commission, appealed to the Supreme Court of Oklahoma, and that court prescribed a rate of 16.875 cents for this movement.

The cement company was not satisfied with the rate of 16.875 cents and following numerous appeals to the Frisco, that carrier finally published, effective October 28, 1924, its tariff I. C. C. No. 8410. Item 20 of this tariff provides that charges on crushed limestone and shale from Lantry and Lawrence to Ada will be collected on basis of $6.60 per car of 80,000 lb. capacity and $8.25 per car of 100,000 lb. capacity. Item 25 states that "the arrangement herein authorized provides that charges will be assessed and collected on basis of rates shown in Item 20 and upon reshipment via St. L.-S. F. Ry. Co. rails of the product (Cement in carloads) the inbound charges on the raw material will be revised to a basis of a charge of ten (10) cents per net ton." Items 30, 35 and 40 provide that readjustment of inbound charges will be made at the close of each month's business, the consignees surrendering paid inbound freight bills to support their claims for refund; that reshipment of the cement from Ada must be made within one year of the date of the inbound movement of crushed limestone or shale; and that for the purpose of computing the readjustment of charges on the stone, 1165 lb. of cement will be considered as the equivalent of 2000 lb. of raw material. The local intrastate rate from Lantry and Lawrence to Ada is, as shown above, 16.875 cents per net ton. This rate would produce a charge of $8.43 per car of 100,000 lb. and $6.75 per car of 80,000 lb. The charges, therefore, that are initially collected under this tariff for the inbound movements are slightly less than would accrue under the local rate. A further difference as between the charges produced by the local rate and those produced under Item 20 may result from the actual loading of the cars as contrasted with the marked capacity. It is not clear from this tariff what rate is to be applied, or, from the evidence, upon what basis the inbound charges are finally adjusted, when the product is forwarded from Ada over a line other than the Frisco or not shipped from Ada within one year from the date of the inbound movement of the raw material.

The suspended tariff, I. C. C. No. 8474, republishes the provisions of I. C. C. No. 8410, and in addition proposes to establish by Item 5 an interstate rate of 6.5 cents per 100 lb. and an intrastate rate of 3 cents per 100 lb. on stone and shale from Lantry and Lawrence to Ada for application when the cement manufactured therefrom is shipped from Ada to interstate or intrastate points, as the case may be, over lines other than the Frisco; and by Item 35 to establish a rate of 3 cents per 100 lb. when the product is not reshipped from Ada within one year from the date of the inbound movement of the raw material. The 6.5 cent rate would result in charges of $52 on a car of 80,000 lb. and $65 on a car of 100,000 lb. Yet the local rate from Ada is, as pointed out, 16.875 cents per net ton. Both tariffs are vague, indefinite, contradictory and appear impossible of execution. It is plain that they are intended to restore in tariff form the substantial provisions of the contract of 1906 between the Frisco and the Cement company. Assuming the lawfulness of the respondent's purpose to control the outbound movement of the cement from Ada by means of a transit arrangement, there appears no justification for charging a rate lower than the local inbound rate upon the theory that the shipments may be given transit. If the shipments were not connected up with an outbound movement, it would be impossible for the carrier to police the shipments and subsequently collect the local rate. Wherefore, all local inbound shipments should in the first instance be subject to the same rates.

The Supreme Court in Central R. R. Co. vs. United States, 257 U. S. 247, 257, in speaking of transit in general, said:

The practice is sometimes beneficial in its results; but it is open to grave abuses. To police it adequately is difficult and expensive. Unless adequately policed, it is an avenue to illegal rebates and seriously depletes the carriers' revenues. Railroad managers differ widely as to the policy of granting such privileges. The commission clearly has power under Section 1 of the Act to Regulate Commerce as amended to determine whether in a particular case a transit privilege should be granted or should be withdrawn.

The principle therein announced would appear to be equally applicable to the facts in the instant proceeding.

We find that the provisions of the existing tariff here under investigation and of the tariff under suspension are, in so far as applicable to interstate traffic, unreasonable and unlawful. Orders will be entered requiring their cancellation.

We will expect that the respondent will see that no unjust or unlawful discrimination is practiced as between interstate and intrastate commerce.

Crushed Rock Freight Rates Lowered in Arizona

THE Southern Pacific railroad was granted special rate authority by the Arizona commission to make material reductions in the rates on crushed rock from Paul Spur near Douglas on the El Paso and Southwestern branch of the road to all shipping points in the state on the Southern Pacific, it was announced at the office of the corporation commission.

Under the new rates, it was stated, a charge of 7½ cents per 100 lb. will be made from Paul Spur to Phoenix. The same rate, it was stated, was authorized at the request of the Southern Pacific railroad.—*Tombstone (Ariz.) Epitaph.*

Demurrage Charges on Frozen Sand and Gravel Claimed Excessive

SAND, gravel and crushed rock shippers present for the eleventh regular meeting of the Trans-Missouri-Kansas Shippers Regional Advisory Board held recently at the Hotel Muehlebach in Kansas City entered a complaint against demurrage charges on sand and gravel frozen in shipment.

The shippers complained that they are forced to pay excessive demurrage charges when the unloading of the cars filled with sand and gravel that have frozen in shipment is delayed because of the frozen materials.

The shippers appealed for a special ruling to apply to the above conditions and the matter was referred to a special committee which will meet later with those interested. —*Lawrence (Kans.) Journal-World.*

Montana Cement Company Asks Revisal of Freight Rates

ON complaint of the Three Forks Portland Cement Co. against all railroad companies operating in Montana, declaring that the present rates on cement, plaster and plaster board are prejudicial to its interests, the Montana railroad commission has set a hearing at an early date.

The Three Forks company operates mills at Trident and Hanover.

At the hearing the request for increased rates on cement and gravel which the railroads serving Montana are asking will be acted on. The rates asked are those of 1920 less 10% general reduction ordered by the I.C.C. in 1922.—*Helena (Mont.) Independent.*

New Machinery and Equipment

New Crawler Tractor

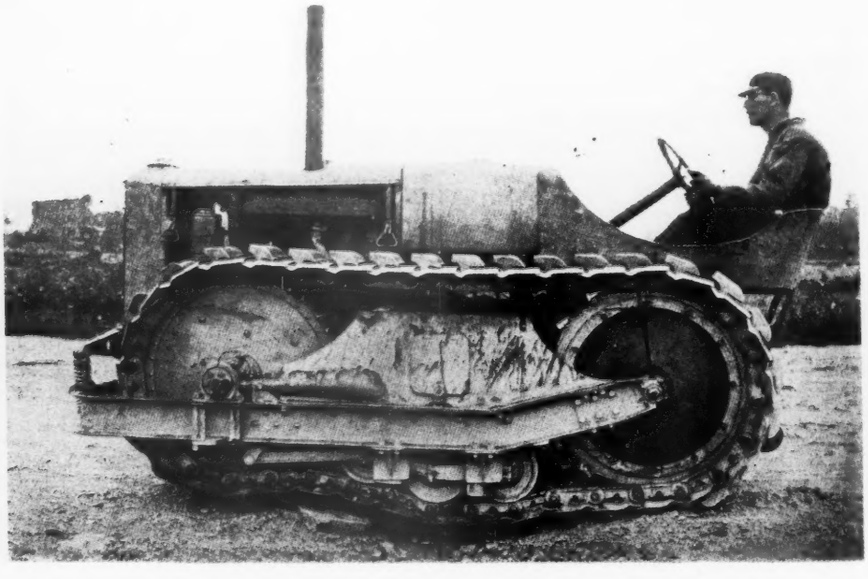
THE Mead-Morrison Co., Boston, Mass., have recently put on the market a tractor which appears to offer unusual flexibility and easy control. A feature of the tractor is the reserve power it possesses, the normal power developed being considered at 36.53 hp. and a claim of 55 hp. development under maximum working conditions. Greater efficiency in traction pull is said to be obtained by the attachment of the draw bar to the steel side frame forward of the center of the tractor and below the center of gravity. For the accommodations of graders, ditchers and other off center loads the drawbar hook slides freely from side to side.

The "55" is made in two types, the open model with summer top and the closed model for winter, which has a two-man cab complete with storage battery lighting equipment. Complete set of tools for both models are standard equipment. The Mead-Morrison Co. gives a guarantee of the 35 hp. development by the tractors. All parts are warranted against defects in material or workmanship for 12 months.

Mead-Morrison "55" Specifications

ENGINE—Type: Extra reserve, heavy duty Stearns, four cylinder, valves in head.
BORE AND STROKE—4¾ in. by 6½ in.
VALVES—Silcrome, 2¼-in. opening.
CRANK SHAFT—Chrome-nickel steel, 2⅞-in. bearing diameters.
LUBRICATION—Pressure feed to all crankshaft, piston pin, cam-shaft and rocker shaft bearings.
IGNITION—Bosch magneto with impulse starter with open model. Berkshire high frequency magneto with closed model.
LIGHTING EQUIPMENT—(Optional) 2 head lights, tail, dash, spotlight, storage battery and instruments.
CARBURETOR—1¾-in. Schebler carburetor.
GOVERNOR—Pierce governor with flyball.
FUEL TANK—Welded seams; 40 gal. capacity.
AIR CLARIFIER—Vortox oil type.
ENGINE CLUTCH—Merchant & Evans multiple disc, dry plate; 5 plates, 11 in. in diameter.
ENGINE SPEED—1000 r.p.m.
COOLING—Spirex sectional radiator. Force pump with capacity of 60 gal. of water per minute. 24-in. fan, silent chain drive, running in oil.
TRANSMISSION—Spur gear selective type. Three speeds forward and one reverse. Direct drive on second and geared up on high. All shafts and gears are of chrome-nickel steel.
STEERING CLUTCHES—Mead-Morrison design multiple disc, dry plate; 5 plates.
BEARINGS—42 sets annular ball bearings.
BEARING LUBRICATION—Oil reservoirs where possible. Alemite system at other minor places.
TRACK—Shoes are stamped and heat-treated in oil. Links are managanese alloy forgings carburized and hardened. No lubrication is necessary.
TRACK LENGTH—64 in. (center to center of sprocket wheels). Width: 12 in.

Specially designed for rough going



New and powerful tractor for industrial use

Driver's cockpit is like that of an aeroplane

GROUSERS—Regular grousers are manganese alloy forgings readily detachable for road work. Special ice grousers and also rubber grousers can be furnished.
WEIGHT OF TRACTOR—Open model, 8700 lb.; closed model, 9250 lb.; with fuel, oil and water.
TURNING RADIUS—6 ft.
HORSEPOWER RATING—Drawbar h.p. at normal speed: 35 h.p. Belt h.p. at normal speed: 43 h.p.
SPEED—Low: 2 m.p.h. Direct: 3 m.p.h. High: 5 m.p.h. Reverse: 1½ m.p.h.
STEERING—Each track controlled by a multiple disc clutch operated by steering wheel.
POWER TAKE-OFF—Furnished as an extra; attaches to rear end of tractor. Can be operated on all transmission speeds; but is recommend for continuous operation on direct gear only. Standard pulley is 12-in. diameter, 9-in. face. Smaller diameter pulleys furnished on special order.
GENERAL DIMENSIONS—Overall width: Open model, 63 in.; closed model, 65 in. Height over tracks: 42 in. Overall height: Open model, 66 in.; closed model, 98 in. Ground clearance: 11 in. Width over tracks: 55 in. Height over radiator: 55 in. Overall length: Open model, 123½ in.; closed model, 124 in.

New Waterproof Bags for Quicklime

ONE of the interesting developments of the past year has been the appearance of a new container for crushed quicklime.

The new container is best described as a heavy jute bag, with two inside liners of heavy kraft paper and a coating of asphalt between each layer, applied hot in order to make the whole fabric waterproof, siftproof and airtight. Bags of 90 lb. (½ bbl.) capacity have been generally adopted. They are closed at the top with a simple wire tie.

One of the most apparent advantages claimed for the waterproof bag is its low initial cost, estimated to be 20 to 25 cents lower per barrel capacity than that of the wooden container. Another important saving is in freight on the container. The 180-lb. lime barrel weighs 15 lb. empty. Two 90-lb. bags weigh only 2½ lb.

Even the 90-lb. unit has proved to be a desirable feature, according to those who have made a study of packing and shipping operations. One man can handle this size, whereas two have customarily been used in stacking or loading a barrel. The rapidity with which bags can be filled and tied does

away with elaborate equipment and with the notably difficult operation of barrel heading.

Certain re-sale advantages have come to light also, as a result of investigation. Lime users can open and close the bag at will, without exposing the remaining contents to the danger of slaking or deterioration. Retailers find it possible to supply customers who buy in small quantities without the necessity of breaking bulk.

Being of textile construction, the producer's brand, name and address can be printed directly upon the container in bright colors and attractive designs, which gives an advertising advantage that is not obtainable with an ordinary paper label pasted on the end of a wooden barrel.

The new waterproof bags are especially adapted to the handling of crushed quicklime of 1 to 1½-in. screen. The fines can be handled just as well. Manufacturers are agreed, however, that the cost of crushing quicklime is so little in comparison with the benefits of the 90-lb. bag unit now on the market that a number of them have found it profitable to take advantage of the saving by packing quicklime the new way.

Waterproof bags, as described above for holding quicklime, were first offered to the lime trade by Bemis Bros. Bag Co., St. Louis, which has supplied many other industries with similar bags for shipping chemicals, dry paints, etc., where absolute protection for the contents is required. This company reports a heavy demand for lime bags which has developed almost over night, and which now represents business from almost every state in the union and from several parts of Canada.

New Gas Shovel

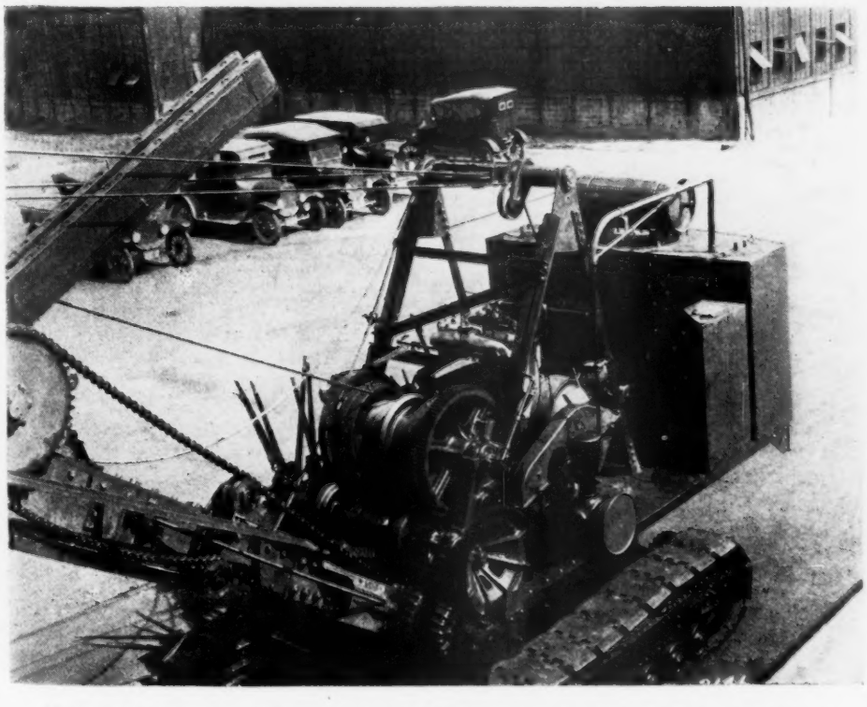
THE McMyler-Interstate Co., of New York, in their new No. 2 gas shovel, claim to have solved the problem of control in a unique manner. The main hoist clutch is set by a ram mechanism similar to that in a steam shovel only in place of steam, compressed air is used. By this means, they say, the flexibility, feel and easy operation of steam shovels is assured, and at the same time operation can be carried on by all steam shovel operators.

Distinct advances in crowder mechanism is claimed. The shipper shaft is driven by a single chain from a sprocket on a shaft concentric with the boom hinge. This drive makes it possible to raise or lower the boom without altering the length of the crowding chain. The clutches for reversing the direction of the crowing motion are located on a shaft at the boom foot. These clutches are driven by spur gears and in fact, there is not a single bevel gear in the entire crowding mechanism.

The crowding clutches and the swinging clutches are operated by means of an eccentric device which so multiplies the force applied to the respective hand levers that practically no manual effort is required.

Another refinement in gas shovel design which is embodied in the No. 2 is the manner in which water is used for cooling the engine and for counterweight. Located at the rear of the turntable is a large capacity water tank. The cooling water for the engine is circulated through this tank, thus eliminating the necessity for a radiator and fan. A constant operating temperature for the engine is obtained. Even when operating in freezing weather, this system is said to have proved practical. No alcohol or other anti-freezing compound is necessary under normal winter conditions.

New gasoline shovel with compressed air hoist control



Main hoist of new gasoline shovel with clutch mechanism similar to standard steam-shovel control

By drawing off this cooling water, the weight of the shovel is reduced considerably—an important factor when transporting the shovel over long distances.

The No. 2 gas shovel is furnished with two independent power drums with air-operated clutches on each drum, making the shovel readily convertible to a 10-ton crane for clam-shell or dragline bucket service. A worm driven boom hoist is standard equipment.

As a shovel, this machine handles a ¾- or 1-cu. yd. dipper. Used as a locomotive crane, it is rated at 10 tons capacity in accordance with the standard rating tests of The Locomotive Crane Manufacturers' Association.

The Rock Products Market

Wholesale Prices of Crushed Stone

Prices given are per ton, F.O.B., at producing point or nearest shipping point

Crushed Limestone

City or shipping point	Screenings, ¼ inch down	½ inch and less	¾ inch and less	1½ inch and less	2½ inch and less	3 inch and larger
EASTERN:						
Buffalo, N. Y.	1.30	1.30	1.30	1.30	1.30	1.30
Chaumont, N. Y.	.50	.....	1.75	1.25	1.25	1.25
Cobleskill, N. Y.	1.35	1.25	1.25	1.25	.....	.....
Coldwater, N. Y.	All sizes at 1.40 per net ton					
Eastern Pennsylvania	1.35	1.35	1.35	1.35	1.35	1.35
Munns, N. Y.	.....	1.00	1.40	1.30	.....	.....
Northern New Jersey	1.60	1.50@1.80	1.30@2.00	1.40@1.60	1.40@1.60	.....
Prospect, N. Y.	1.00	1.40	1.40	1.30	1.30	.....
Walford, Penn.	1.00	1.30	.....	1.50h	1.50h	.....
Watertown, N. Y.	.50	.....	1.75	1.50	1.50	1.50
Western New York	.85	1.25	1.25	1.25	1.25	1.25
CENTRAL						
Alton, Ill.	1.85	.....	1.85	1.50	.....	.....
Bloomville, Middlepoint, Dunkirk Bellevue, Waterville, No. Baltimore, Holland, Kenton, New Paris, Ohio; Monroe, Mich.; Huntington, Bluffton, Ind.	1.00	1.10	1.10	1.00	1.00	1.00
Buffalo and Linwood, Iowa	1.10	.....	1.20	1.00	1.05	1.05
Chasco, Ill.	.....	1.15	1.15	1.15	1.15	.....
Chicago, Ill.	.80	1.00	1.00	1.00	1.00	1.00
Columbia, Krause, Valmeyer, Ill.	1.00@1.75	1.20	1.20	1.20	1.20	1.40
	Flux all at 1.30					
Cypress, Ill.	1.25	1.15	1.10	1.10	1.10	1.10
Dundas, Ont.	.70	.90	.90	.90	.90	.90
Gary, Ill.	1.00	1.37½	1.37½	1.37½	1.37½	1.37½
Greencastle, Ind.	1.25	1.25	1.15	1.05	.95	.95
Lannon, Wis.	.80	1.00	1.00	.90	.90	.90
Northern New Jersey	1.30	.....	1.80	1.60	1.40	.....
River Rouge, Mich.	1.10	1.10	1.10	1.10	1.10	1.10
Sheboygan, Wis.	1.10	1.10	1.10	1.10	1.10	1.10
St. Vincent de Paul, Que.	.85	1.35	1.05	.95	.90	.90
Stone City, Iowa	.75	.....	1.20	1.10	1.05	.....
Toronto, Ont.	.....	1.95	1.80	1.80	1.80	.....
Waukesha, Wis.	.90	.90	.90	.90	.90	.90
Wisconsin Points	.50	.....	1.00@1.15	.90@1.05	.90@1.05	.....
SOUTHERN:						
Alderson, W. Va.	.60	1.60	1.60	1.50	1.40	.....
Allgood, Ala.	Crusher run, fines out, for flux, 1.00 per net ton					
Cartersville, Ga.	1.65	1.65	1.65	1.15	1.15	1.15
Chico, Texas	1.00	1.40	1.35	1.25	1.20	1.10
El Paso, Texas	1.00	1.10	1.10	1.10	1.10	.....
Ft. Springs, W. Va.	.50	1.60	1.50	1.35	1.25	.....
Graystone, Ala.	Crusher run fluxing stone, 1.00 per net ton					
Henderson, N. C.	.....	.....	1.50	.....	1.25	.....
Olive Hill, Ky.	.50@1.00‡	1.00	1.00	1.00	1.00	1.00
Rockwood, Ala.	.90	.....	.....	.....	1.00	.90
Rocky Point, Va.	.50@1.00	1.40@1.60	1.30@1.40	1.15@1.35	1.10@1.20	1.00@1.05
WESTERN:						
Atkinson, Kans.	.25	2.00	2.00	2.00	2.00	1.60‖@1.80
Blue Spr'ngs & Wymore, Neb.	.20	1.45	1.45	1.35c	1.25d	1.20
Cape Girardeau, Mo.	1.25	.....	1.25	1.25	1.00	.....
Kansas City, Mo.	1.00	1.80	1.80	1.80	1.80	1.80
Rock Hill, St. Louis Co., Mo.	1.25	1.35	1.35	1.35	1.35	1.25

Crushed Trap Rock

City or shipping point	Screenings, ¼ inch down	½ inch and less	¾ inch and less	1½ inch and less	2½ inch and less	3 inch and larger
Branford, Conn.	.60	1.70	1.45	1.20	1.05	.....
Duluth, Minn.	.90	2.25	1.90	1.50	1.35	1.35
Dwight, Calif.	1.75	1.75	1.75	1.75	1.75	.....
Eastern Maryland	1.00	1.60	1.60	1.50	1.35	1.35
Eastern Massachusetts	.85	1.75	1.75	1.25	1.25	1.25
Eastern New York	.75	1.25	1.25	1.25	1.25	1.25
Eastern Pennsylvania	1.10	1.70	1.60	1.50	1.35	1.35
New Haven, New Britain, Meriden & Wallingford, Conn.	.60	1.70	1.45	1.20	1.05	1.05
Northern New Jersey	1.50e	2.00	1.80	1.40	1.40	.....
Oakland and El Cerritto, Cal.	1.00	1.00	1.00	.90	.90	.....
San Diego, Calif.	.70e	1.80f	1.60	1.40g	1.30	.....
Sheboygan, Wis.	1.00	1.10	1.10	1.10	1.10	.....
Springfield, N. J.	1.80	2.10	2.10	1.70	1.60	1.60
Westfield, Mass.	.60	1.50	1.35	1.20	1.10	1.10

Miscellaneous Crushed Stone

City or shipping point	Screenings, ¼ inch down	½ inch and less	¾ inch and less	1½ inch and less	2½ inch and less	3 inch and larger
Atlanta, Ga. (granite)	1.35	2.35	2.35	2.00	2.00	2.00
Berlin, Utley and Red Granite, Wis.—Granite	1.50	1.60	1.35	1.25	1.25	1.00
Coldwated, N. Y.—Dolomite			1.50 all sizes			
Columbia, S. C.—Granite	.50	1.75	1.75	.....	1.60	.....
Eastern Penn.—Sandsone	1.35	1.70	1.65	1.40	1.40	1.40
Eastern Penn.—Quartzite	1.20	1.35	1.25	1.20	1.20	1.20
Lithonia, Ga.	.75	1.75	1.60	1.25	1.25	.....
Lohrville, Wis.—Granite	1.65	1.70	1.65	1.45	1.50	.....
Middlebrook, Mo.—Granite	3.00@3.50	.....	2.00@2.25	2.00@2.25	.....	1.25@2.00
Northern New Jersey (Basalt)	1.50	2.00	1.80	1.40	1.40	.....
Richmond, Calif. (Basalt)	.75*	.....	1.50*	1.50*	1.50*	.....

*Cubic yd. †1 in. and less. ‡Two grades. ‖Rip rap per ton. (a) Sand. (b) to ¼ in. (c) 1 in., 1.40. (d) 2 in., 1.30. (e) Dust. (f) ¼ in. (h) less 10c discount. (i) 1 in., 1.40.

Agricultural Limestone
(Pulverized)

Alton, Ill.—Analysis 99% $CaCO_3$, 0.3% $MgCO_3$; 90% thru 100 mesh 50% thru 4 mesh	6.00 3.00
Asheville, N. C.—Analysis, 57% $CaCO_3$, 39% $MgCO_3$; 50% thru 100 mesh; 200-lb. burlap bag, 4.00; bulk	2.75
Belfast and Rockland, Me. (rail), Lincolnville, Me. (water), analysis $CaCO_3$ 90.04%; $MgCO_3$ 1.5%, 100% thru 14 mesh, bags Bulk	4.50 3.00
Branchton and Osborne, Penn.—100% thru 20 mesh; 60% thru 100 mesh; 45% thru 200 mesh. (Less 50 cents commission to dealers)	5.00
Cape Girardeau, Mo.—Analysis, 93% $CaCO_3$, 3.5% $MgCO_3$; pulverized; 50% thru 50 mesh	1.50
Cartersville, Ga.—Analysis 68% $CaCO_3$, 32% $MgCO_3$; pulverized 50% thru 50 mesh	3.00 1.50
Chaumont, N. Y.—Pulverized limestone, bags, 4.00; bulk	2.50
Chico, Texas—90% thru 100 mesh 50% thru 100 mesh 90% thru 50 mesh 50% thru 50 mesh	4.50 3.50 3.00 2.50
Colton, Calif.—Analysis 90% $CaCO_3$, bulk	4.00
Danbury, Conn., Rockdale and West Stockbridge, Mass.—Analysis, 90% $CaCO_3$, 5% $MgCO_3$; 50% thru 100 mesh; paper bags, 4.75; cloth, 5.25; bulk	3.25
Dundas, Ont., Can.—Analysis, 53.80% $CaCO_3$, 43.31% $MgCO_3$; 35% thru 100 mesh, 50% thru 50 mesh, 100% thru 10 mesh; bags, 4.75; bulk	3.00
Henderson, N. C. (paving dust)—80% thru 200 mesh, bags Bulk Analysis $CaCO_3$, 56%; $MgCO_3$, 42%; 65% thru 200 mesh, bags Bulk	4.25@ 4.75 3.00@ 3.50 3.95 2.70
Hillsville, Penn.—Analysis, 94% $CaCO_3$, 1.40% $MgCO_3$; 75% thru 100 mesh; sacked	5.00
Janesville, N. Y.—Analysis, 89.25% $CaCO_3$; 5.25% $MgCO_3$; pulverized, bags, 4.00; bulk	2.50
Knoxville, Tenn.—Analysis, 52% $CaCO_3$, 37% $MgCO_3$; 80% thru 100 mesh; bags, 3.95; bulk	2.70
Linville Falls, N. C.—Analysis, 57% $CaCO_3$, 39% $MgCO_3$; 50% thru 100 mesh; 200-lb. burlap bag, 4.00; bulk	2.75
Marblehead, Ohio—Analysis, 83.54% $CaCO_3$, 14.92% $MgCO_3$; 60% thru 100 mesh; 70% thru 50 mesh; 100% thru 10 mesh; 80 lb. paper sacks, 5.10; bulk	3.60
Marion, Va.—Analysis, 90% $CaCO_3$, pulverized, per ton	2.00
Mayville, Wis.—Analysis, 54% $CaCO_3$, 44% $MgCO_3$; 90% thru 100 mesh	3.90@ 4.50
Mountville, Va.—Analysis 76 60% $CaCO_3$, 22.83% $MgCO_3$; 100% thru 20 mesh—burlap bags	5.00
Piqua, Ohio—Total neutralizing power 95.3%; 99% thru 10, 60% thru 50; 50% thru 100 100% thru 10, 90% thru 50, 80% thru 100; bags, 5.10; bulk 99% thru 100, 85% thru 200; bags, 7.00; bulk	2.50@ 2.75 3.60 5.50
Rocky Point, Va.—Analysis, 95% $CaCO_3$; 50% thru 200 mesh Asphalt filler dust, 80% thru 200 mesh	1.75@ 2.00 3.00@ 3.50
Waukesha, Wis.—90% thru 100 mesh	3.70
Watertown, N. Y.—Analysis, 96-99% $CaCO_3$; 50% thru 100 mesh; bags, 4.00; bulk	2.50
West Rutland, Vt.—90% thru 100 mesh; 7.00 in bags; bulk	4.50

Agricultural Limestone
(Crushed)

Alderson, W. Va.—Analysis, 90% $CaCO_3$; 90% thru 50 mesh	1.50
Atlas, Ky.—Analysis over 90% $CaCO_3$; 90% thru 4 mesh	1.00@ 2.00
Bedford, Ind.—Analysis, 98.5% $CaCO_3$, 0.5% $MgCO_3$; 90% thru 10 mesh	1.50
Bettendorf, Iowa—97% $CaCO_3$, 2% $MgCO_3$; 50% thru 100 mesh; 50% thru 4 mesh	1.50
Blackwater, Mo.—Analysis, 99% $CaCO_3$; 90% thru 4 mesh	.60@ 1.00

(Continued on next page)

Agricultural Limestone

(Continued from preceding page)

Bridgeport and Chico, Texas—Analysis, 94% $CaCO_3$, 2% $MgCO_3$; 100% thru 10 mesh	1.75
50% thru 4 mesh	1.50
Chasco, Ill.—50% thru 100 mesh	1.20
Chicago, Ill.—50% thru 100 mesh; 90% thru 4 mesh	.80
Columbia, Krause, Valmeyer, Ill.—Analysis, 90% $CaCO_3$; 90% thru 4 mesh	1.35
Cypress, Ill.—90% thru 100 mesh	1.25
50% thru 100 mesh, 90% thru 50 mesh, 50% thru 50 mesh, 90% thru 4 mesh, 50% thru 4 mesh	1.15
Ft. Springs, W. Va.—Analysis, 90% $CaCO_3$; 90% thru 50 mesh	1.50
Garnet, Okla.—All sizes	**1.25**
Gary, Ill.—Analysis, approx. 60% $CaCO_3$, 40% $MgCO_3$; 90% thru 4 mesh	.75
Kansas City, Mo.—50% thru 100 mesh	**1.00**
Lannon, Wis.—Analysis, 54% $CaCO_3$, 44% $MgCO_3$; 99% through 10 mesh; 46% through 60 mesh	2.00
Screenings (¼ in. to dust)	1.00
Marblehead, Ohio.—Analysis, 83.54% $CaCO_3$, 14.92% $MgCO_3$, 32% thru 100 mesh; 51% thru 50 mesh; 83% thru 10 mesh; 100% thru 4 mesh (meal) bulk	1.60
Mayville, Wis.—Analysis, 54% $CaCO_3$, 44% $MgCO_3$; 50% thru 50 mesh	1.85@ 2.35
Middlepoint, Bellevue, Kenton, Ohio; Monroe, Mich.; Huntington and Bluffton, Ind.—Analysis, 42% $CaCO_3$, 54% $MgCO_3$; meal, 25 to 45% thru 100 mesh	1.60
Milltown, Ind. — Analysis $CaCO_3$, 93.10%, 40% thru 50 mesh	**1.35@ 1.60**
Moline, Ill., and Bettendorf, Iowa—Analysis, 97% $CaCO_3$, 2% $MgCO_3$; 50% thru 100 mesh; 50% thru 4 mesh	1.50
Pixley, Mo.—Analysis, 96% $CaCO_3$; 50% thru 50 mesh	1.25
50% thru 100 mesh; 90% thru 50 mesh; 50% thru 50 mesh; 90% thru 4 mesh; 50% thru 4 mesh	1.65
River Rouge, Mich.—Analysis, 54% $CaCO_3$, 40% $MgCO_3$; bulk	.80@ 1.40
Stone City, Iowa. — Analysis, 98% $CaCO_3$; 50% thru 50 mesh	.75
Tulsa, Okla.—Analysis $CaCO_3$, 86.15%, 1.25% $MgCO_3$, all sizes	**1.25**
Waukesha, Wis.—Test, 107.38% bone dry, 100% thru 10 mesh; bags, 2.85; bulk	2.10

Pulverized Limestone for Coal Operators

Hillsville, Penn., sacks, 4.50; bulk	3.00
Piqua, Ohio, sacks, 4.50@5.00 bulk	3.00@ 3.50
Rocky Point, Va.—80% thru 200 mesh	3.00@ 3.50
Waukesha, Wis.—99% thru 100 mesh, bulk	**4.25**

Miscellaneous Sands

Silica sand is quoted washed, dried and screened unless otherwise stated. Prices per ton f.o.b. producing plant.

Glass Sand:	
Berkeley Springs, W. Va	2.00@ 2.25
Cedarville and S. Vineland, N. J.—Damp	1.75
Dry	2.25
Cheshire, Mass.: 6.00 to 7.00 per ton; bbl	2.50
Columbus, Ohio	1.25
Estill Springs and Sewanee, Tenn	1.50
Franklin, Penn.	2.00
Gray Summit and Klondike, Mo	2.00
Los Angeles, Calif.—Washed	5.00
Mapleton Depot, Penn	2.00@ 2.25
Massillon, Ohio	3.00
Mineral Ridge and Ohlton, Ohio	2.50
Oceanside, Calif.	3.00
Ottawa, Ill.—Chemical and mesh guaranteed	1.25
Pittsburgh, Penn.—Dry	4.00
Damp	3.00
Red Wing, Minn.: Bank run	1.50
Ridgway, Penn.	2.00
Rockwood, Mich.	2.75@ 3.25
Round Top, Md.	2.25
San Francisco, Calif.	4.00@ 5.00
St. Louis, Mo.	2.00
Sewanee, Tenn.	1.50
Thayers, Penn.	2.50
Utica, Ill.	1.00@ 1.15
Zanesville, Ohio	2.50
Miscellaneous Sands:	
Aetna, Ind.: Core, Box cars, net, .35; open-top cars	.30
Albany, N. Y.: Molding coarse	2.00
Molding fine, brass molding	2.25
Sand blast	4.00

(Continued on next page)

Wholesale Prices of Sand and Gravel

Prices given are per ton, F.O.B., producing plant or nearest shipping point

Washed Sand and Gravel

City or shipping point	Fine Sand, 1/10 in. down	Sand, ¼ in. and less	Gravel, ½ in. and less	Gravel, 1 in. and less	Gravel, 1½ in. and less	Gravel, 2 in. and less
EASTERN:						
Ambridge & So. S'g'ts, Penn.	1.25	1.25	1.15	.85	.85	.85
Attica and Franklinville, N. Y.	.75	.75	.85	.75	.75	.75
Buffalo, N. Y.	1.10	.95			.85	
Erie, Pa.		1.00*	1.50*		1.75*	
Farmingdale, N. J.		.48	1.05	1.20	1.10	
Hartford, Conn.	.65*					
Machias Jct., N. Y.		.75	.75	.75	.75	.75
Montoursville, Pa.	1.00	1.10	1.00	.75	.75	.75
Northern New Jersey	.50	.50	1.25	1.25	1.25	
Olean, N. Y.		.75	.75	.75	.75	.75
Shining Point, Penn.			1.00	1.00	1.00	1.00
South Heights, Penn.	1.25	1.25	.85	.85	.85	.85
Washington, D. C.	.85	.85	1.70	1.50	1.30	1.30
CENTRAL:						
Algonquin and Beloit, Wis.	.50	.40	.60	.60	.60	.60
Attica, Covington and Summit Grove, Ind.	.60@ .85	.60@ .85	.75@ .85	.75@ .85	.75@ .85	.75@ .85
Barton, Wis.		.50	.75	.75	.75	.75
Boston, Mass.‡	1.60	1.60	2.25	2.00		2.00
Chicago, Ill.	1.20	1.10	1.10			1.00
Columbus, Ohio	.65	.65	.65	.65	.65	.65
Des Moines, Iowa	.40	.40	1.20	1.50	1.50	1.50
Eau Claire, Wis.	.40	.40	.80	.95		.85
Elkhart Lake, Wis.	.60	.40	.40	.50	.50	.50
Ft. Dodge, Iowa	.85	.85	2.05	2.05	2.05	2.05
Ft. Worth, Texas	2.00	2.00	2.00	2.00	2.00	2.00
Grand Haven, Mich.		.40@ .80		.60@1.00		
Grand Rapids, Mich.	.50	.50		.80	.70	.70
Hamilton, Ohio		1.00			1.00	
Hersey, Mich.		.50				.70
Humboldt, Iowa		.85	2.00	2.00	2.00	
Indianapolis, Ind.	.60	.60		.90	.75@1.00	.75@1.00
Janesville, Wis.		.65@ .75			.65@ .75	
Mason City, Iowa	.45@ .55	.45@ .55	1.35@1.45	1.45@1.55	1.40@1.50	1.35@1.45
Mankato, Minn., and Appleton		.40		1.25	1.25	1.25
Mattoon, Ill.	.75	.75	.75	.75	.75	.75
Milwaukee, Wis.		1.01	1.21	1.21	1.21	1.21
Moline, Ill.	.60@ .85	.60@ .85	1.00@1.20	1.00@1.20	1.00@1.20	1.00@1.20
Northern New Jersey	.45@ .50	.45@ .50		1.25	1.25	
Palestine, Ill.	.75	.75	.75	.75	.75	.75
Silverwood, Ind.	.75	.75	.75	.75	.75	.75
St. Louis, Mo.	1.18	1.45	1.65	1.45	1.65	1.45c
Terre Haute, Ind.	.75	.60	.75	.85	.75	.75
Wolcottville, Ind.	.75	.75	.75	.75	.75	.75
Waukesha, Wis.		.45	.60	.60	.65	.65
Winona, Minn.	.40	.40	1.50	1.25	1.10	1.00
Yorkville, Sheridan, Oregon, Moronts, Ill.		.40@ .70	.30@ .50	.50@ .60	.60	.60
Zanesville, Ohio		.60	.50		.80	
SOUTHERN:						
Charleston, W. Va.		All sand, 1.40.		All gravel, 1.50.		
Chattanooga, Tenn.		1.40	1.35	1.20	1.20	1.20
Chehaw, Ala.	00@ .30		.40	.50		
Knoxville, Tenn.	.75@1.00	.75@1.00	1.20	1.20	1.20	1.00
Lindsay, Texas					.55	
Macon, Ga.		.50			.75	
New Martinsville, W. Va.	1.00	.90@1.00		1.30		.80@ .90
Roseland, La.	.50	.50	2.00		1.00	
Smithville, Texas		.90	.90	.90	.90	.75
WESTERN:						
Baldwin Park, Calif.	.20	.20	.40	.50	.50	
Kansas City, Mo.	.80	.70				
Los Angeles, Calif. (d)	.50	.40	.40	.75	.75	.75
Los Angeles district (bunkers)†	1.50	1.40	1.85	1.85	1.85	1.85
Phoenix, Ariz.	1.25*	1.00*	2.50*	2.00*@2.25*	1.75*	1.50*
Pueblo, Colo.	1.10*	.90*		1.60*		1.50*
San Diego, Calif.		.60	1.25	1.20	1.00	1.00
Seattle, Wash. (bunkers)	1.50*	1.50*	1.50*	1.50*	1.50*	1.50*

Bank Run Sand and Gravel

City or shipping point	Fine Sand, 1/10 in. down	Sand, ¼ in. and less	Gravel, ½ in. and less	Gravel, 1 in. and less	Gravel, 1½ in. and less	Gravel, 2 in. and less
Algonquin and Beloit, Wis.			Dust to 3 in., .40			
Boonville, N. Y.	.60@ .80		.55@ .75			1.00
Chehaw, Ala.	00@ .30					
Chicago, Ill.	.95					
Des Moines, Iowa	.50					
Dudley, Ky. (crushed silica)	1.10	1.10		.95		
East Hartford, Conn.			Sand, .75 per cu. yd.			
Elkhart Lake, Wis.	.50					
Gainesville, Texas		.95				.55
Grand Haven, Mich.						.80@1.00
Grand Rapids, Mich.				.60		
Hamilton, Ohio					.70	
Hersey, Mich.				.50		
Indianapolis, Ind.		Mixed gravel for concrete work, at .65				
Lindsay, Texas						.55
Macon, Ga.		.35				
Mankato, Minn.			Pit run sand, .50			
Moline, Ill. (b)	.60	.60	Concrete gravel, 50% G., 50% S., 1.00			
Montezuma, Ind.						.60
St. Louis, Mo.			Mine run gravel, 1.55 per ton			
Shining Point, Penn.			Concrete sand, 1.10 ton			
Smithville, Texas	.50	.50	.50	.50	.50	.50
Summit Grove, Ind.	.50	.50	.50	.50	.50	.50
Waukesha, Wis.	.60	.60	.60	.60	.60	.60
Winona, Minn.	.60	.60	.60	.60	.60	.60
York, Penn.	1.10	1.00				
Zanesville, Ohio						

(a) ¾ in. down. (b) River run. (c) 2½ in. and less.
*Cubic yd. †Include freight and bunkerage charges and truck haul. ‡Delivered on job.
(d) Less 10c per ton if paid E.O.M. 10 days.

Miscellaneous Sands

(Continued from preceding page)

Arenzville, Ill.:		
Core		.75
Molding fine	1.50@	1.75
Beach City, Ohio:		
Core		1.75
Stone, sawing, coarse		1.75
Molding, fine and coarse, washed	1.75@	2.25
Traction	1.50@	2.00
Furnace lining	2.00@	2.50
Cheshire, Mass.:		
Glass sand, 24 and 40 mesh, bulk		5.00
Columbus, Ohio:		
Core	.30@	1.50
Traction	.30@	1.25
Molding coarse	1.25@	1.50
Stone sawing		1.50
Molding fine	1.75@	2.00
Furnace lining	2.00@	2.50
Sand blast	3.00@	4.00
Brass molding		2.00
Eau Claire, Wis.:		
Sand blast	3.00@	3.25
Core		1.00
Roofing sand		4.25
Elco, Ill.:		
Ground silica per ton in carloads	18.00@	31.00
Elnora, N. Y.:		
Brass molding		1.75
Estill Springs and Sewanee, Tenn.:		
Molding fine and core		1.25
Roofing sand, sand blast, traction	1.35@	1.50
Franklin, Penn.:		
Core		2.00
Molding, fine and coarse		1.75
Gray Summit and Klondike, Mo.:		
Core, roofing and brass molding		2.00
Molding fine and coarse, traction		1.75
Furnace lining		1.00
Stone sawing	.85@	1.00
Joliet, Ill.:		
No. 2 molding sand; also loam for luting purposes and open-hearth work	.65@	.85
Kasota, Minn.:		
Stone sawing		1.00
Mapleton Depot, Penn.:		
Glass sand	2.00@	2.25
Molding fine, traction and sand blast		2.00
Massillon, Ohio:		
*Glass sand		3.00
Core, furnace lining, molding fine and coarse		2.50
Traction		2.00
Michigan City, Ind.:		
Core and Traction	.15@	.30
Mineral Ridge and Ohlton, Ohio:		
Furnace lining, molding coarse, sand blast, traction (damp)		1.75
Roofing sand (damp)	1.75@	2.00
Core, molding fine (damp)		2.00
Glass sand (dry)		2.50
Montoursville, Penn.:		
Traction		1.10
Core	1.25@	1.50
New Lexington, Ohio:		
Molding fine		2.00
Molding coarse		1.50
Oceanside, Calif.:		
Roofing sand		3.50
Ottawa, Ill.:		
Molding coarse (crude silica, not washed or dried)	.75@	1.00
Red Wing, Minn.:		
Core, furnace lining, stone sawing		1.50
Molding fine and coarse, traction		1.25
Sand blast		3.50
Filter sand		3.75
Ridgeway, Pa.:		
Glass sand	2.15@	2.50
Molding fine		1.50
Core		1.75
Molding coarse	1.25@	1.50
Round Top, Md.:		
Core		1.60
Glass sand		2.00
Sand blast		2.25
Roofing sand		2.25
St. Louis, Mo.:		
Core	1.00@	1.75
Furnace lining		1.50
Molding fine	1.50@	2.50

Crushed Slag

City or shipping point	Roofing	¼ in. down	½ in. and less	¾ in. and less	1½ in and less	2½ in. and less	3 in. and larger
EASTERN:							
Buffalo, N. Y., Emporium nd Dubois, Pa.	2.25	1.25	1.25	1.25	1.25	1.25	1.25
Eastern Penn. and Northern Penn.	2.50	1.20	1.50	1.20	1.20	1.20	1.20
Reading, Pa.	2.50	1.00	.....	1.25	.....	.....	.....
Western Penn.	2.50	1.25	1.50	1.25	1.25	1.25	1.25
CENTRAL:							
Ironton, Ohio	2.05	1.35	1.65	1.45	1.35	1.45	1.45
Jackson, Ohio	.....	1.05	.....	1.30	1.05	1.30	1.30
Toledo, Ohio	1.50	1.25	1.25	1.25	1.25	1.25	1.25
Youngst'n, O., dist.	2.00	1.25	1.35	1.35	1.25	1.25	1.25
SOUTHERN:							
Ashland, Ky.	.....	1.45	.....	1.55	1.45	1.55	1.55
Ensley and Alabama City, Ala.	2.05	.80	1.35	1.25	.90	.90	.80
Longdale, Roanoke, Ruessens, Va.	2.50	1.00	1.25	1.25	1.25	1.15	1.15

Lime Products (Carload Prices Per Ton F.O.B. Shipping Point)

	Finishing hydrate	Masons' hydrate	Agricultural hydrate	Chemical hydrate	Ground burnt lime, Blk.	Ground burnt lime, Bags	Lump lime, Blk.	Lump lime, Bbl.
EASTERN:								
Berkeley, R. I.	.....	.....	12.00	.....	.....	.....	.....	2.20
Buffalo, N. Y.	.....	10.00	12.00	12.00	.....	.....	.....	.....
Lime Bridge, Penn.	.....	.....	.....	.....	.....	.....	5.00a	.....
West Stockbridge, Mass. (f)	13.00	10@11.00	5.00	.....	.....	.....	.....	2.25t
Williamsport, Penn.	.....	.....	10.00	.....	.....	.....	6.00	.....
York, Penn.	.....	10.50	10.50	11.50	.....	.....	8.50	1.65i
CENTRAL:								
Cold Springs, Ohio (f)	12.50	10.00	9.00	.....	9.00	11.00	9.00	.....
Delaware, Ohio	12.50	10.00	9.00	10.50	9.00	15.00	9.00	1.50
Gibsonburg, Ohio (f)	12.50	10.00	9.00	.....	9.00	11.00	9.00	.....
Luckey, Ohio (f)	12.50	.....	.....	.....	.....	.....	.....	.....
Huntington, Ind.	12.50	10.00	9.00	.....	.....	.....	9.00	.....
Luckey, Ohio (f)	12.50	.....	.....	.....	.....	.....	.....	.....
Marblehead, Ohio	.....	10.00	9.00	.....	.....	.....	9.00	1.50c
Marion, Ohio	.....	10.00	9.00	.....	.....	.....	9.00	1.50c
Sheboygan, Wis.	.....	.....	.....	.....	.....	.....	9.50	.....
Tiffin, Ohio	.....	.....	.....	.....	9.00	.....	.....	.....
White Rock, Ohio	12.50	.....	.....	.....	9.00	11.00	9.00	.....
Woodville, Ohio (f)	12.50†	10.00†	9.00†	12.50†	9.00	10.00	8.50	1.50
SOUTHERN:								
Allgood and Saginaw, Ala.	12.50	10.00	.....	10.00	.....	1.35u	8.50	1.50
El Paso, Texas	.....	.....	.....	.....	.....	.....	10.00	1.75
Graystone, Wilmay and Landmark, Ala.	12.50	11.00	.....	11.00	.....	10.00	8.50	.....
Karo, Va.	.....	10.00	9.00	.....	.....	.....	7.00g	1.65h
Knoxville, Tenn.	20.50	11.00	.....	.....	.....	1.35	8.00	1.50
Ocala and Zubz, Fla.	12.50	12.00	10.00	.....	.....	.....	12.00	1.70
Varnons, Ala. (f)	.....	10.00p	10.00p	.....	.....	.....	8.00q	1.40r
WESTERN:								
Kirtland, N. M.	.....	.....	.....	.....	.....	.....	15.00	.....
San Francisco, Calif.	21.00	21.00	15.00	21.00	.....	.....	14.50	1.90v
Tehachapi, Calif.	.....	.....	8.00	.....	.....	.....	13.00z	2.20x

†50-lb. paper bags; (a) run of kilns; (c) wooden, steel 1.70; (d) wood; (e) per 180-lb. barrel; (f) dealers' prices; (g) to 9.50; (h) to 1.75; (i) 180-lb. net barrel 1.65; 280-lb. net barrel, 2.65 (m) finishing lime, 3.00 common; (n) common lime; (o) high calcium; (p) to 11.00; (q) to 8.50; (r) to 1.50; (s) in 80-lb. burlap sacks; (t) common, 2.50 plastering; 3.00 finishing; (u) two 90-lb. bags; (v) wood burnt; (x) wood, steel $2.30; (z) to $15.00.

*Quoted f.o.b. New York.

Miscellaneous Sands

(Continued)

Molding coarse	1.25@	1.75
Roofing sand		1.75
Sand blast	3.50@	4.50
Stone sawing	1.25@	2.25
Traction		1.25
Brass molding	2.00@	3.00
San Francisco, Calif.:		
(Washed and dried) — Core, sand blast and brass molding	3.50@	5.00
Furnace lining and roofing sand	3.50@	4.50
Molding fine and traction		3.50
Molding coarse		4.50
(Direct from pit)—Core and molding fine	2.50@	4.50
Sewanee, Tenn.:		
Molding fine and coarse, roofing sand, sand blast, stone sawing, traction, brass molding		1.25
Skerkston, Ont.:		
Traction (lake sand)		.65
Tamalco, Ill.:		
Molding coarse	1.25@	1.50
Tamms, Ill.:		
Ground silica per ton in carloads	20.00@	31.00
Thayers, Penn.:		
Core		2.00
Molding fine and coarse		1.25
Traction		2.25
Utica, Ill.:		
Glass sand, molding fine and brass molding	1.00@	1.25
Core and molding coarse	.55@	1.25
Furnace lining	.60@	1.25
Traction		1.00
Roofing and stone sawing	1.00@	2.50
Sand blast		2.50
Utica, Penn.:		
Core		2.00
Molding fine and coarse		1.75
Warwick, Ohio:		
Core, molding fine and coarse (green)		1.75
Core, molding fine (dry)		2.25
Zanesville, Ohio:		
Molding fine	1.75@	2.00
Molding coarse	1.50@	1.75
Brass molding		1.50

Talc

Prices given are per ton f.o.b. (in carload lots only), producing plant, or nearest shipping point.

Baltimore, Md.:		
Crude talc (mine run)	3.00@	4.00
Ground talc (20-50 mesh), bags		10.00
Cubes		55.00
Blanks (per lb.)		.08
Pencils and steel worker's crayons, per gross		.08 1.25
Chatsworth, Ga.:		
Crude talc		5.00
Ground (150-200 mesh), bags		10.00
Pencils and steel workers' crayons, per gross	1.10@	1.50
Chester, Vt.:		
Ground (150-200-mesh) bulk	9.50@	10.50
Bags included	10.50@	11.50
Chicago and Joliet, Ill.:		
Ground (150-200 mesh), bags		30.00
Dalton, Ga.:		
Crude talc		5.00
Ground talc (150-200) bags		10.00
Pencils and steel workers' crayons, per gross	1.00@	2.50
Emeryville, N. Y.:		
(Double air floated) including bags; 325 mesh		14.75
200 mesh		13.75
Hailesboro, N. Y.:		
Ground white talc (double and triple air floated) including bags, 350 mesh	15.50@	20.00
Henry, Va.:		
Crude (mine run)	3.50@	4.00
Ground (150-200 mesh) ,bags	8.00@	14.00
Joliet, Ill.:		
Ground talc (150-200) bags		30.00
Keeler, Calif.:		
Ground (200-300 mesh), bags	20.00@	30.00
Natural Bridge, N. Y.:		
Ground talc (300-325 mesh), bags		13.00

Rock Phosphate

Prices given are per ton (2240-lb.) f.o.b. producing plant or nearest shipping point.

Lump Rock

Gordonsburg, Tenn.—B.P.L. 68-72%	4.50@	5.00
Tennessee—F. O. B. mines, gross ton, unground Tenn. brown rock, 72% min. B.P.L.		5.50
Twomey, Tenn.—B.P.L. 65%, 2000 lb.	7.00@	8.00

Ground Rock

(2000 lbs.)

Centerville, Tenn.—B.P.L. 65%		7.00
Gordonsburg, Tenn.—B.P.L. 68-72%	4.00@	5.00
Mt. Pleasant, Tenn.—B.P.L. 72%	5.00@	6.00
Twomey, Tenn.—B.P.L. 65%	7.00@	8.00

(Continued on next page)

Concrete Block (Concrete Pipe prices on succeeding page)

Prices given are net per unit, f.o.b. plant or nearest shipping point

City or shipping point	Sizes 8x8x16	8x10x16	8x12x16
Columbus, Ohio	.17@.19†	.....	.27@29†
Detroit, Mich.	16.00*	.....	25.00*
Forest Park, Ill.*	18.00	23.00	30.00
Indianapolis, Ind.	.13@.15†	.....	.....
Los Angeles, Calif.	4x3½x12—.03;	6x3½x12—.04½;	8x3½x12—.05½
Oak Park, Ill.	.18@.21a	.23@.26a	.....
Somerset, Pa.	20@.22	.....	.....

*Price per 100 at plant. † Rock or panel face. (a) Face.

Cement Tile

Prices are net per sq. in carload lots, f.o.b. nearest shipping point unless otherwise stated.

	Hawthorne tile, per sq.	—Cicero— Red	Green
Cicero, Ill.			
Red Spanish	10.00		
Green Spanish	12.00		
Red French	9.50		
Green French	11.50		
Ridges		.25	.35
Hips		.20	.30
Ridge closers		.05	.06
Hip terminals, 3 way		1.25	1.50
Hip starters		.50	.60
Gable finials		1.25	1.50
Gable starters		.20	.30
End bands		.20	.30
Eave closers		.06	.08
Cement City, Mich. — 5"x8"x12", per M	55.00		

Detroit, Mich.—5x8x12, per C	8.00
Grand Rapids, Mich.:	Per 1000
5x4x12	45.00
5x8x12	70.00
5x8x 6	35.00
Indianapolis, Ind.—9"x15"	
Gray	10.00
Red	11.00
Green	13.00
Longview, Wash.—(Stone Tile)	Per 1000
4x6x12	60.00
4x8x12	65.00
Pasadena, Calif.:	Per 1000
4x4x12	$30.00
4x6x12	50.00
4x8x12	60.00
Wildasin Spur, Los Angeles, Calif.:	
4x3½x12	.03½
6x3½12	.04½
8x3½x12	.05½

(Continued from preceding page)

Florida Phosphate

(Raw Land Pebble)

(Per Ton.)

Florida—F. O. B. mines, gross ton, 68/66% B.P.L., Basis 68%	2.50
70% min. B.P.L., Basis 70%	2.75
72% min. B.P.L., Basis 72%	3.00
75/74% B.P.L., Basis 75%	4.00

Fluorspar

Fluorspar, 85% and over calcium fluoride, not over 5% silica, per net ton, f.o.b. Illinois and Kentucky mines	16.00
No. 2 lump, per net ton	19.00
Fluorspar, foreign, 85% calcium fluoride, not over 5% silica, c.i.f. Philadelphia, duty paid, per net ton	16.00
Fluorspar, No. 1 ground bulk, 95 to 98% calcium fluoride, not over 2½% silica, per net ton, f.o.b. Illinois and Kentucky mines	32.50

Special Aggregates

Prices are per ton f.o.b. quarry or nearest shipping point.

City or shipping point	Terrazzo	Stucco-chips
Barton, Wis., f.o.b. cars		10.50
Brandon, Vt.—English pink and English cream	*11.00	*11.00
Chicago, Ill. — Stucco chips, in sacks f.o.b. quarries		17.50
Crown Point, N. Y.—Mica Spar		10.00
Easton, Pa., and Phillipsburg, N. J.—Green granite	16.00@20.00	16.00@20.00
Haddam, Conn. — Felstone buff	15.00	15.00
Harrisonburg, Va.—Blk marble (crushed, in bags)	†12.50	†12.50
Ingomar, Ohio		4.00@18.00
Middlebrook, Mo.—Red		20.00@25.00
Middlebury, Vt.—Middlebury white	‡9.00	‡9.00
Milwaukee, Wis.		14.00@34.00
Newark, N. J.—Roofing granules		7.50

New York, N. Y.—Red and yellow Verona		32.00
Red Granite, Wis.		7.50
Sioux Falls, S. D.	7.50	7.50
Stockton, Calif.—"Natrock" roofing grits		12.00@15.00
Tuckahoe, N. Y.		12.00
Villa Grove, Colo.		13.00
Wauwatosa, Wis.		16.00@45.00
Wellsville, Colo.—Colorado Travertine Stone	15.00	15.00

†C.L. Less than C.L., 15.50.
*C.L. including bags; L.C.L. 14.50.
‡C.L. including bags; L.C.L. 10.00.

Concrete Brick

Prices given per 1000 brick, f.o.b. plant or nearest shipping point.

	Common	Face
Appleton, Minn.	20.00	25.00@35.00
Baltimore, Md. (Del. according to quantity)	15.50	22.00@50.00
Ensley, Ala. ("Slagtex")	12.50	22.50@33.50
Eugene, Ore.	25.00	35.00@75.00
Friesland, Wis.	22.00	32.00
Longview, Wash.	18.00	25.00@50.00
Milwaukee, Wis.	15.00@16.00	30.00@42.00
Omaha, Neb.	18.00	30.00@40.00
Pasadena, Calif.	12.50	
Philadelphia, Penn.	†15.25	‡20.50
Portland, Ore.	15.00@17.00	23.00@150.00
Prairie due Chien, Wis.	14.00	25.00@32.00
Rapid City, S. D.	18.00	25.00@45.00
Watertown, N. Y.	21.00	35.00
Wauwatosa, Wis.	14.00	20.00@42.00
Winnipeg, Man.	14.00	22.00

†Gray. ‡Red.

Sand-Lime Brick

Prices given per 1000 brick f.o.b. plant or nearest shipping point, unless otherwise noted.

Barton, Wis.	10.50
Boston, Mass.	14.00@15.50
Brighton, N. Y.	16.75
Dayton, Ohio	12.50@13.50
Detroit, Mich.	14.00@15.00
Farmington, Conn.	14.00
Grand Rapids, Mich.	12.00
Hartford, Conn.	14.00
Jackson, Mich.	13.00
Lancaster, N. Y.	13.00
Michigan City, Ind.	11.00
Milwaukee, Wis.	13.00
Portage, Wis.	15.00
Rochester, N. Y. (del. on job)	19.75
Saginaw, Mich.	13.00
San Antonio, Texas	13.00@13.50
Syracuse, N. Y.	(i) 17.00
Terra Cotta, D. C.	13.50
Wilkinson, Fla.-White	12.00
Buff	16.00

Gray Klinker Brick

El Paso, Texas	13.00

Portland Cement

Prices per bag and per bbl, without bags net in carload lots.

	Per Bag	Per Bbl.
Albuquerque, N. M.	.....	3.47
Atlanta, Ga.	.....	2.75*
Baltimore, Md.	.....	2.35
Birmingham, Ala.	.....	2.50*
Boston, Mass.	.....	2.25
Buffalo, N. Y.	.....	2.48
Butte, Mont.	.90¼	3.61
Cedar Rapids, Iowa	.....	2.44
Charleston, S. C.	.....	2.85
Cheyenne, Wyo.	.86½	3.46
Cincinnati, Ohio	.....	2.47
Cleveland, Ohio	.....	2.39
Chicago, Ill.	.....	2.20
Columbus, Ohio	.....	2.44
Dallas, Texas	.48¾	2.15
Davenport, Iowa	.....	2.39
Dayton, Ohio	.....	2.48
Denver, Colo.	.66¼	2.65
Detroit, Mich.	.....	2.25
Duluth, Minn.	.....	2.19
Houston, Texas	.....	2.60
Indianapolis, Ind.	.....	2.39
Jackson, Miss.	.....	3.00*
Jacksonville, Fla.	.....	2.85
Jersey City, N. J.	.....	2.33
Kansas City, Mo.	.....	2.17
Los Angeles, Calif.	.63	2.52
Louisville, Ky.	.....	2.45
Memphis, Tenn.	.65	2.60
Milwaukee, Wis.	.....	2.25
Minneapolis, Minn.	.....	2.42
Montreal, Que.	.....	1.90
New Orleans, La.	.....	2.80*
New York, N. Y.	.....	2.25
Norfolk, Va.	.....	2.35
Oklahoma City, Okla.	.....	2.56
Omaha, Neb.	.....	2.51
Philadelphia, Pa.	.....	2.31
Phoenix, Ariz.	.....	3.70
Pittsburgh, Penn.	.....	2.19
Portland, Ore.	.....	2.60
Reno, Nevada	.75¼	3.01
Richmond, Va.	.....	2.47
Salt Lake City, Utah	.70¼	2.81
San Francisco, Calif.	.....	2.31
Savannah, Ga.	.....	2.85
St. Louis, Mo.	.57½	2.30
St. Paul, Minn.	.....	2.42
Seattle, Wash.	.....	2.65
Tampa, Fla.	.....	3.05
Toledo, Ohio	.....	2.40
Topeka, Kans.	.....	2.40
Tulsa, Okla.	.....	2.43
Wheeling, W. Va.	.....	2.27
Winston-Salem, N. C.	.....	3.19*

NOTE—Add 40c per bbl. for bags.

Mill prices f.o.b. in carload lots, without bags, to contractors.

	Per Bag	Per Bbl.
Buffington, Ind.	.....	1.95
Chattanooga, Tenn.	.....	2.45*
Concrete, Wash.	.....	2.35
Davenport, Calif.	.....	2.05
Hannibal, Mo.	.....	2.05
Hudson, N. Y.	.....	2.05
Leeds, Ala.	.....	.....
Mildred, Kans.	.....	2.35
Nazareth, Penn.	.....	1.95
Northampton, Penn.	.....	1.95
Steelton, Minn.	.....	2.00
Universal, Penn.	.....	1.95

*Including sacks at 10c each.

Gypsum Products—CARLOAD PRICES PER TON AND PER M SQUARE FEET, F. O. B. MILL

	Crushed Rock	Ground Gypsum	Agricultural Gypsum	Stucco Calcined Gypsum	Cement and Gauging Plaster	Wood Fiber	White Gauging	Sanded Plaster	Keene's Cement	Trowel Finish	—Plaster Board— ¼x32x 36". Wt. 1500 lb. Per M Sq. Ft.	⅜x32x 36". Wt. 1850 lb. Per M Sq. Ft.	Wallboard, ⅜x32 or 48". Lgths. 6'-10', 1850 lb. Per M Sq. Ft.
Centerville, Iowa	2.00@2.50	15.00f	15.00h	8.00	10.00	9.50	11.00	.....	25.80	11.00	.....	.....	.....
Douglas, Ariz.	.....	.....	7.00	.....	.....	15.50d	18.50	.....	30.00	15.50	.....	.....	.....
Grand Rapids, Mich.	1.50@1.75	.....	6.00	9.00@11.00	8.00@10.00	8.00@ 10.00	.....	.....	30.00	.....	.....	.....	30.00
Gypsum, Ohio‡	3.00	4.00	6.00	8.00	9.00	9.00	.....	7.00	27.00	18.00	20.00	20.00	30.00
Hanover, Mont.	.....	.....	.....	11.80	.....	.....	.....	.....	.....	.....	.....	.....	.....
Los Angeles, Calif.	.....	.....	8.00b	10.40	.....	.....	.....	.....	.....	.....	.....	.....	.....
Port Clinton, Ohio	3.00	4.00	6.00	10.00	9.00	9.00	21.00	7.00	30.15	20.00	.....	20.00	30.00
Portland, Colo.	.....	.....	.....	10.00	.....	.....	.....	.....	.....	.....	.....	.....	.....
San Francisco, Calif.	.....	.....	.....	.....	16.40	.....	17.40	.....	.....	.....	.....	.....	.....
Sigurd, Utah	.....	.....	.....	.....	.....	.....	.....	.....	18.00a	.....	.....	.....	.....
Winnipeg, Man.	5.00	5.00	7.00	13.00	14.00	14.00	.....	.....	.....	.....	20.00	25.00	33.00

NOTE—Returnable bags, 10c each; paper bags, 1.00 per ton extra (not returnable).
*To 3.00; †to 11.00; ‖to 12.00; ‡prices per net ton, sacks extra; (a) to 21.00; (b) net; (c) gross. (d) hair fibre; (f) delivered; (h) delivered in 6 states; (i) delivered on job.

(Cement Products Prices continued on page 80)

Cement Pipe

Prices are net per foot f.o.b. cities or nearest shipping point in carload lots unless otherwise noted.

Culvert and Sewer	4 in.	6 in.	8 in.	10 in.	12 in.	15 in.	18 in.	20 in.	22 in.	24 in.	27 in.	30 in.	36 in.	42 in.	48 in.	54 in.	60 in.
Detroit, Mich.*	.13½	.20¼	.31½	.47¼	.60¾	1.08	1.62¼	1.95	2.60	2.92½	3.00	3.30	3.75	5.40	6.50	.....	.....
Grand Rapids, Mich. (b)	.....	.....	.....	.60	.72	1.00	1.28	.....	.....	1.92	2.32	3.00	4.00	.....	.....	.....	.....
Indianapolis, Ind. (a)	.....	.....	.....	.80	.90	1.10	1.30	.....	.....	1.70	.....	2.70	.....	.....	.....	.....	.....
Longview, Wash.	Sewer pipe 40% off list, culvert—list																
Norfolk, Nebr. (b)	.....	.....	.....	.90	1.00	1.13	1.42	.....	.....	2.11	.....	2.75	3.58	.....	6.14	.....	7.78
Wahoo, Nebr. (b)	.....	.....	.....	.....	1.00	1.13	1.42	.....	.....	2.11	.....	2.75	3.58	4.62	6.14	6.96	7.78
Waukesha, Wis.	4-in. to 24-in.—8.00 per ton																

*30-in. lengths up to 27-in. diam., 48-in. lengths after; (a) 24-in. lengths; (b) Reinforced; (c) Interlocking bar reinforced.

Florida Leads in Rock Phosphate Production in U. S.

FLORIDA produces more phosphate rock than all the other states put together. In 1923 the phosphate rock mined in Florida amounted to 2,421,571 long tons out of a total for the United States of 2,943,566 tons. The value of the phosphate rock sold in the United States in 1923 was $11,576,049 and of this Florida sold $9,059,427 worth.

The government has two extensive phosphate reserves, one in Florida, and the other in the western states. A total of 122,816 acres of phosphate land that has been reserved is in Florida. This is in small lots ranging from less than 40 acres to 160 acres in 31 counties. It is distributed in a broad belt that extends from the Apalachitola river at the northwest as far south as the mouth of the Caloosahatthee river, near Ft. Myers, and is from 10 to 100 miles wide.—*Kansas City (Mo.) Star.*

Trade Associations to Be Advised on Legal Matters

ANNOUNCEMENT was recently made from the United States Attorney-General's office at Washington, D. C., that trade association executives and members will hereafter be welcome to submit existing or contemplated activities or plans of organization to the Department of Justice for study as to their legality. While the announcement made clear that no attempt will be made to give any association a clean bill of health, nor assure it against prosecution in the event the law is violated, trade association executives may submit their activities or plans to the department with the understanding that the obviously illegal will be pointed out.

Lime Company Adds Large Rotary Kiln

WE are officially informed that the American Lime and Stone Co. of Bellefonte, Penn., is to add a second rotary kiln, 9x175 ft., to their lime plant at Bellefonte, Penn. The addition was authorized by vote of directors of the company at a recent meeting of the board.

The new rotary kiln is a duplication in size of the one already in use at the plant. Plans call for another plant addition to take care of the kiln production, but do not include any additions to the stone crushing, screening or hydrating plant. Actual field work has already begun and the plant is expected to be completed early next year. W. R. Cliffe is superintendent of the company and Arthur C. Hewitt is the engineer in charge of construction and design.

Tremendous Increase in Imports of Cement on Pacific Coast

WITH the recent arrival of the Steamer Rizi from Antwerp, Belgium, at Portland, Ore., with Belgian cement consigned to a local concern, imports of cement reached a figure of 395,565 sacks for the present year up to September 30. This is far in excess of the imports for 1924 for the same period, which totalled only 43,238 sacks.—*Portland (Ore.) Oregonian.*

Kansas Local Sand Rate Adjustment

SAND shipped from Relock to Belleville, Kans., over the Rock Island railroad hereafter will get the same rate, 3½ cents per 100 lb., as has been in effect from Clay Center to Belleville, under an order issued recently by the public service commission of Kansas.—*Topeka (Kans.) Capital.*

Portland Awards Cement Contract To Local Producer

PORTLAND will buy its cement from Oregon producers, although but one bid was submitted and there was no foreign competition, the city council determined when it awarded the contract for 5000 bbl. to the Orgeon Portland Cement Co., Portland, Ore., at $3 per bbl. gross. This will mean a net price to the city of $2.55, which is 5 cents a barrel less than the city paid last year.

The contract was awarded on the basis of a reduced bid after the city council threw out other bids that were received previously. At that time the cement companies offered to sell the city cement at $3.10 per bbl. gross and the foreign companies offered Belgian cement at $2.70 gross. The domestic companies, however, contended that the city should buy at home to assist Oregon payrolls and said that domestic cement could not compete with foreign cement because of higher payrolls here and the fact that foreign cement comes in generally as ballast and at exceptionally low freight rates.—*Portland (Ore.) Oregonian.*

Cut Asked on Intercity Gravel, Sand Rates in Texas

MOTION has been made by the Texas state railroad commission for the reduction of freight rates between Beaumont and Port Arthur on crushed stone, gravel, sand and commodities of similar classification, from the present figures of 50 cents per ton to a new rate of 44 cents per ton, a reduction of 6 cents. Notice to this effect was received today at the Chamber of Commerce traffic bureau office from Austin with the announcement that a hearing in the matter will be held at the commission's office soon. The reduction ordered by the state rail board comes on the heels of a recent order which lowered the Beaumont-Port Arthur rate on the commodities mentioned from 60 cents to 50 cents, a reduction of 10 cents per ton.—*Port Arthur (Texas) News.*

Large Limestone Shipments Made to Farmers

IN Salina county, Missouri, the county extension agent, S. L. Pippin, reports that more limestone has been used this year on soils than in the whole of the past 15 years. The total received to date has been over 3700 tons. Jefferson County Farm Bureau, Iowa, increased its orders within the last month. Farmers of Bureau county, Illinois, ordered over 40 carloads within two weeks. The county farm bureau of Fremont, Penn., reports increased demands for limestone from farmers in the locality. And so it might go on. It is good evidence that the present-day farmer is becoming alive to the advantages of limestone.

Steamer Bought for Pacific Coast Gypsum Trade

JAMES GRIFFITHS AND SONS of Seattle, general agents for the Alaska-Mexico Transport Co., recently purchased the 7600-ton steel steamship Dallas from the U. S. Shipping Board. It will be used to tow the barges Daylight of 6500 tons and Griffson of 4200 tons, both in the gypsum trade from the San Marcos Island, Southern California gypsum deposit of the Standard Gypsum Co., to the company's plaster mills at Long Beach, Calif., and Seattle, Wash. The boat will be rechristened the S. A. Perkins, after the president of the Alaska-Mexico Transport Co., who is also chairman of the board of directors of the Standard Gypsum Co.—*Seattle (Wash.) Marine-Digest.*

Local Crushed Stone Freight Rate Hearing

THE Nebraska railway commission will hear a complaint of Sunderland Bros. Co., Omaha, Neb., against the Northwestern and Burlington railroads, relative to rates on crushed stone shipments.—*Lincoln (Neb.) Star.*

Sand and Gravel Production for 1924

THE output of sand and gravel in 1924 from plants in the United States, as reported to the Bureau of Mines, Department of Commerce, amounted to about 156,527,967 short tons, valued at $97,241,641. This was an increase of 12% in quantity and 7% in value over the production reported for 1923.

Seven states shipped over 10,000,000 tons each—New York, Indiana, Illinois, Michigan, Pennsylvania, California, and Ohio, in the order named, New York shipping 13,397,540 tons and Ohio 10,379,361 tons. Pennsylvania led in value of output, its shipments being valued at $10,927,752. New York, Ohio, Illinois, California, Michigan, and Indiana followed in the order named, the output of Indiana being valued at $5,070,339. Many other states showed increases. The average value per short ton was 62 cents, as compared with 65 cents in 1923.

Ballou White Sand Company to Build Office and Laboratory

WE have received from J. F. Ballou, manager of the Ballou White Sand Co., Millington, Ill., news that they have completed the plans for the erection of a new office building at their plant. In connection with the office there will be maintained a general testing laboratory for the testing of the graded products which range from sand blast sand to air floated silica. By this means the exact matching of all samples received will be obtained.

The company has been in operation for 20 years and is engaged in working deposits of high-grade silica.

Central Silica Company Building New Plant

THE Central Silica Co., Zanesville, Ohio, is building a new plant at Glass Rock, Ohio, on the New York Central railway. The plant will have a production of 300 tons per day. Provision in design permits the building of additional units of 300 tons per day capacity. The plant is being designed and equipped by the Lewistown Foundry and Machine Co., under the direction of Edwin Frost, executive engineer.

Officials of the company say that this is the only silica deposit yet found in Ohio and that the product has a content of only .03% iron. The completion of the plant is expected by December 25 this year.

Oklahoma City Contracts for Hydrated Lime

OKLAHOMA CITY, OKLA., has awarded contract for 1500 tons of hydrated lime to be used by the water department to the Hunkin-Willis Co. of St. Louis, Mo., on a bid of $17.20 per ton.—*Oklahoma City (Okla.) Times.*

Tuckahoe Stone Company Ordered to Close Eastchester Quarry

THE $500,000 marble quarry of the Tuckahoe Stone Corporation at Eastchester, Westchester county, N. Y., is destined to remain idle in the future, the Court of Appeals having affirmed a judgment enjoining the corporation from operating it. The litigation was started by Harris F. McNeish, who brought the case before Justice Tompkins. He granted an injunction preventing the quarrying, and the Appellate Division, Second Department, has upheld him.

It is held that the use of the premises violated a zoning ordinance of Eastchester, adopted on October 15, 1923.—*New York Times.*

Monroe Residents Seek Damages from France Stone Company

THE case of Frank Ainslee and 84 other residents of Monroe, Mich., against the France Stone Co., of Toledo, Ohio, asking that the company be enjoined from operating a stone quarry and prevent alleged damages and destruction of their properties, was started at Monroe recently before Circuit Judge Jesse H. Root.

The petitioners ask $150,000 for damages to their property caused by blasts at the Monroe quarry of the company.

One witness who owns property nearby testified that stones had come through the roof of his house.—*Toledo (Ohio) News-Bee.*

Quarry Dock Damaged by Fire

FIRE of unknown origin recently did damage estimated at $10,000 to the dock and a crane of the Mensinger Quarry Co., on the Columbia river waterfront west of Coffin Rock, near Longview, Wash. The river steamer *Georgiana,* which happened to be passing at the time, played two small streams on the fire until the Longview fire department arrived and extinguished the flames, after considerable difficulty, due to difficulty of making water connections.—*Tacoma (Wash.) Ledger.*

Marble Quarry Sold

THE marble quarry at West Rutland was sold at auction recently by Fred R. Patch of this city as trustee for the bondholders of the defunct Columbian corporation to Patrick F. McCormick of West Rutland, president of the Clarendon Marble Co., which is expected to operate the quarry. The property, which covers a tract of about six acres, was bid off for $5200. The quarry which changed hands has been idle for five or more years. The pit was opened nearly 30 years ago, and marble was taken from it at various times under several groups of men who operated the Columbian company under different names.—*White River (Vt.) Landmark.*

American Refractories Institute to Hold Annual Fall Meeting at New York

THE fall meeting of the American Refractories Institute will be held at the Waldorf-Astoria hotel, New York City, on October 29.

The program, in addition to regular business matters, includes a number of technical papers and a detailed discussion of the work of the institute. Of especial interest to consumers of refractories will be the part of the program dealing with specifications. The research division of the refractories fellowship at Mellon Institute, working in cooperation with advisory committees of technical men, is making a critical study of the existing tests for refractories and accumulating data on furnace conditions so that satisfactory specifications can be written. An outline of the plans that have been made for such work will be given and a progress report made. Non-members are invited to attend.

Pasadena Sand and Gravel Plant Sold

THE Eaton Canyon Rock and Sand Co., of Pasadena, Calif., has been sold by the owners, E. B. and R. C. Williams, H. G. Koster and F. Snyder to J. S. Lutes of Pasadena. The new owner has started extensive operations to add to the plant capacity and with the ultimate intention of tripling the present 1000 ton per day output of the plant. The plant supplies many of the local contractors with their sand and gravel needs. It is located at New York avenue and Santa Anita streets, Pasadena.—*Pasadena (Calif.) Star-News.*

Canada Crushed Stone Corporation Entertains Purchasing Agents

THE Canada Crushed Stone Corp., Ltd., Dundas, Ont., recently entertained a party of purchasing agents. The party was taken through the quarries where they were shown how the holes were filled with dynamite and how the blasts were fired. Mr. Harstone, service engineer, explained the geological formation. Several carloads of stone were put through the crusher and screening plant, bins, etc., and the loading operations. The visitors were then treated to a luncheon presided over by George McHaffie, sales manager, assisted by Mr. Harstone, service engineer; Mr. Lindsay, manager of the Hagersville plant; A. E. Fish, and Roy Watson. Among those at the head table were W. A. MacLachlan, purchasing agent for the Department of Highways; Mr. McBurney, road superintendent of Halton county; Mr. Jackson, of Brant county; G. Marston, of Simcoe county; Wm. Forbes, of Oxford county, and H. A. Lumsden, of Wentworth county.

Illinois Near Top in Use of Cement

ILLINOIS, situated in the center of a great portland cement producing region, is second among the states in the use of this building material, figures issued by the United States Geological Survey show. Nearly one-tenth of the portland cement used in this country last year was used in Illinois.

Illinois and three of her neighbor states, Indiana, Missouri and Iowa, have portland cement plants which are capable of manufacturing over 35,000,000 bbl. of cement a year. These four states used approximately 25,869,400 bbl. in 1924, according to the government figures. So the capacity to produce is nearly 10,000,000 bbl., or 35% more than these states used in 1924, giving a wide margin in regard to any further growth in the demand for cement in this region.—*Chicago (Ill.) Journal of Commerce.*

New York Leads in Use of Cement

THE state of New York, by using one of every eight and a third barrels of portland cement shipped in the United States, leads the nation in the use of this building material, figures issued by the U. S. Geological Survey show.

New York is also one of the largest producers of cement, having ranked sixth among the 29 producing states last year with a total production of 7,457,000 bbl. or 30,188,000 sacks. The nine plants in this state are capable of making over 9,000,000 bbl., an amount 20% in excess of the largest actual production.

Portland cement stucco is being used to a large extent in the Empire State as a home building material.

Numerous concrete block factories have been built and portland cement in this form is also finding a wide usage.

Montreal Makes Large Cement Shipments to Florida and Europe

MONTREAL is in some part profiting from the construction boom in Florida, for nearly 30,000 tons of cement have been shipped since the opening of navigation to Miami or Jacksonville, repesenting eight cargoes of approximately 3750 tons apiece. This amount is only a modicum, however, of the amount that has been shipped from this port. Newfoundland and European ports having taken a large quantity.

Warrior Cement Adds New Silos to Demopolis Plant

THE Warrior Cement Corp. of Chattanooga, Tenn., has let the contract for the erection of six concrete storage silos and packing plants at their Demopolis, Ala., plant to the Bland Engineering Co., of Minneapolis. The storage capacity will be increased 110,000 bbl. by this addition.

New Cement Products Plant for Florida

A NEW manufacturing plant now under construction on an acre and a half tract in Croissant Park near Fort Lauderdale will involve an expenditure of about $70,000, says the *Fort Lauderdale Herald.* The plant is being built for the Florida Cement Products Co., which specializes in the manufacture of national stone tile products, building blocks and septic tanks. The plant will open with an expected daily capacity of 30,000 cement blocks, and the output will be increased as the business grows.

National Cement Company Strengthens Financial Position

AN event of considerable importance in manufacturing circles was the completion of arrangements by National Cement Co. of Montreal, Canada, for the inclusion on the board of several men of outstanding position in industrial and financial circles; Senator J. M. Wilson, Donat Raymond, Henry Timmins and Hon. Georges Simard.

In connection with these appointments it is understood that these four subscribed for $1,000,000 of 8% preferred stock of the company between them, providing close to $1,000,000 additional capital and placing the completion of the new plant beyond doubt. Definite arrangements have been made for starting up the manufacturing of cement in Montreal East on the first of November, with a capacity of 900,000 bbl. per year.

The capitalization of the company as it stands after the new financing will be as follows:

First mortgage bonds, 7%	$1,500,000
Preferred stock, 8%	2,500,000
Common, no par value	50,000 shs.

Of the preferred stock, $1,000,000 had been sold prior to the latest arrangement, and the additional $1,000,000 brings the total disposed of to $2,000,000, leaving $500,000 of preferred stock still in the treasury. It is reported that the company after completion of the present financing will have $500,000 as working capital. The sale of the second block had a favorable influence on the price of bonds, which moved up considerably.

The company expects to have its manufacturing in full swing by the first of the new year, with 3 kilns in operation steadily. It is anticipated that the increased demand for cement will enable the company to secure a good year's business. It is understood that the addition to the board of the company leaves the former group still in control and that their interests were not acquired but that the new element have simply become associated with Joseph Versailles and other in the undertaking.

Mr. Versailles will continue as president of the company, with Mr. Raymond as vice-president. The other members are E. C. Vidricaire and Richard K. Meade.

Lone Star—Symbol of International System

THE significance of the brand name, Lone Star, is at once apparent. This name has been used for two decades by the Texas Portland Cement Co., the cornerstone of the International System. It is a name which symbolizes a system of fair business dealing and rigid adherence to high quality standards—methods and standards tested out and perfected initially in Texas, and later used as the basis upon which the International System has been developed. Thus, its use by the other plants of the system is quite appropriate.

The Lone Star brand is already established in Louisiana and is well known in the trade of Mississippi, so that its use by International's Birmingham mill is a short step. The new mill at Norfolk, Va., which will commence operation this fall, will also market its product under the Lone Star brand.

Thus with two plants in Texas, one in Birmingham and one at Norfolk, the entire South will be served with International cement, marketed under the Lone Star brand.

The new Indiana property of the International system will also use the name Lone Star in order to take advantage of the spreading popularity of this honorable cement name.

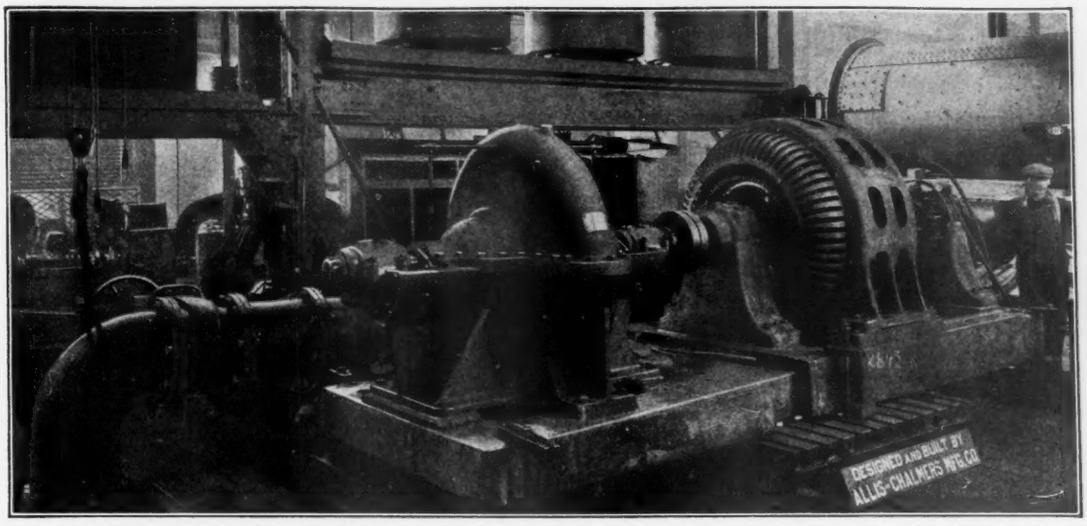
For the present, the product of the Knickerbocker Portland Cement Co., Inc., will continue to be known at Knickerbocker cement, and the product of the Kansas Portland Cement Co. will continue to be known as Sunflower cement.—*International Bulletin.*

Aerated Cement Houses on Exhibit at London Show

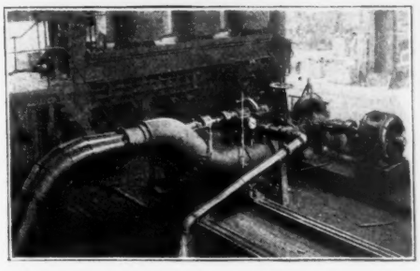
AN aerated dwelling said to be much cheaper in cost than either wood or brick houses, is one of the features of the British Empire exhibition which opened in London recently.

The process was developed in Sweden, where it has been used in apartment houses. The peculiar quality of this aerated concrete is that it expands and then sets hard. It is fireproof, resists noise and, it is contended by the inventor, strengthens with age.

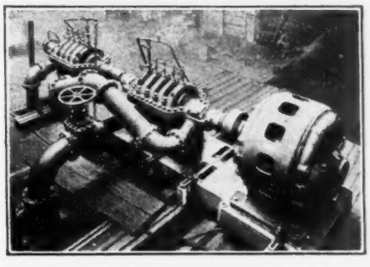
A chemical process takes place when cement and coal slag are mixed with certain substances of a mineral character, and the hydrogen creates little bubbles in the mixture which swells up like yeast in bread, until it resembles cork. Then it begins to harden. It is possible to produce in this way a concrete so light that a cubic foot weights but 20 lb. as compared with 130 lb. for an ordinary concrete block, says an Associated Press dispatch. It floats on water like wood and can be made practically impervious to dampness.—*Detroit (Mich.) Free Press.*



Testing a large high head pump.



Testing a hydraulic turbine driven pump.

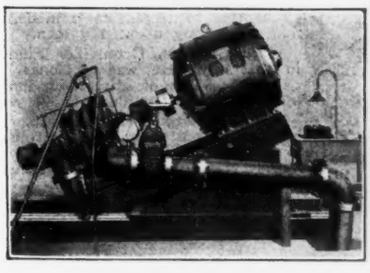


Testing bronze mine pump.

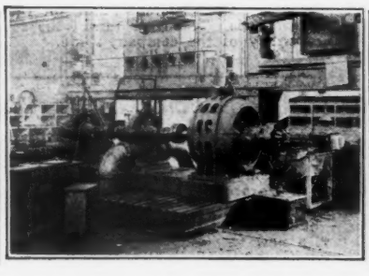
Our Testing

Assures You Full Value From Allis-Chalmers Centrifugal Pumping Units

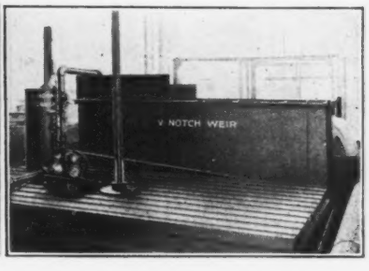
That a pumping unit will do the work for which it has been sold is more important than a few dollars' difference in first cost. Allis-Chalmers Centrifugal Pumps have been given many special tests so our customers can have this assurance. We can also furnish our own motors with our pumps which provides the additional safeguard of Combined Responsibility.



Testing a pump for a mine slope.



Testing synchronous motor driven pumps.



Testing a small 1" pump motor driven.

ALLIS-CHALMERS

MILWAUKEE, WIS. U. S. A.

News of All the Industry

Incorporations

National Potash Co., Paducah, Ky., $250,000. T. W. Woodley, L. C. Harper.

Kaw Valley Sand and Dredging Co., Kansas City, Kas., $5000.

Synthetic Stone Co., Dallas, Tex., $10,000. Nick and Mary Scott and John Bianchi.

Joplin Marble Quarries Co., Joplin, Mo., $100,000. Geo. M. Spiva, Frank Childress.

Atlas Lime Co., El Paso, Tex., $8000. J. P. Sheenan, F. B. Stuart and A. Guadagnoli.

Joplin Marble Co., Joplin, Mo., $10,000. C. H. Carter, Carthage, and T. C. Pennington of Joplin.

International Art Concrete House Co., Inc., New Orleans, La., $25,000, by Louis Hufft and others.

Lake Shore Cement Products Co., Somers, Wis., $15,000. R. H. Dolan, J. W. German and S. G. Lewis.

Western Stone Products Co., Denver, Colo., $1,000,000. R. C. Whitely, H. R. McDonald and John Bruehne.

Arkansas Slate Co., Norman, Ark., $100,000. Norman R. Strong, L. U. and Davis Holt, E. B. Bird and C. W. Fretts.

Progressive Concrete Construction Co., St. Louis, Mo., by Charles E. Roop, 1608 Belleview, Charles T. Stevens and others.

Liberty Cement Block Corp., New York, $15,000. J. F. and F. Matucci, J. Mattana. (Attorney, D. B. Getz, 215 Montague St.)

M. S .W. Products Co., Trenton, N. J., $125,000. Manufacture artificial stone, concrete brick, tile, etc. Trenton Trust Co. Bldg., Trenton.

Floral Park Sand Co., Floral Park, N. Y., $10,000. C. and A. Weber, J. Wagner. Attorneys, Levy, Fishel and Burke, Freeport, N. Y.

Louisville Cement Co., of New York, Inc., Akron, Erie County, N. Y., manufacturing cement. Incorporator: H. S. Gray, 315 Guthrie street, Louisville, Ky.

National Sand Co., Pittsburgh, Penn., $5000. Mining and marketing of sand and gravel. R. D. McKee, 33 So. Euclid Ave., W. H. McNaugher and G. F. Taylor, Garrick, Penn.

Grenei and Ellis Co., Peekskill, N. Y., quarrying. 500 shares of $100 par, 1,000 shares no par. T. H. Ellis, B. M. Grenei and E. A. Rudiger. A. C. Wart, attorney, 233 Broadway, N. Y.

Carolina Mineral Products Corp., Greenville, S. C., $250,000. J. G. Mock, president, Wallace Bldg.; A. C. Martin, secretary. Install grinding mill for feldspar; daily capacity 80 tons.

Sand and Gravel

Enwood Sand and Rock Co. have engaged in business at 85 Second street, San Francisco, Calif.

Fredonia, Kas., has purchased a plot of land which will be operated as a municipal gravel pit.

Platte Valley Gravel and Sand Co., Schuyler, Neb., is now drawing power from the city power plant.

Longmont, Colo., street department has purchased a 70-yd. per day crusher for use in the municipal gravel pit.

San Angelo, Tex., road commission has purchased a 16-ton per hour portable rock crusher for use on city road work.

St. Joe Lime Co., St. Joe, Ark., has obtained contract from the city of Marshall, Ark., for crushed rock to be used on streets.

Hinde Bros., Northland Ave., Toronto, Canada, have been so successful with the first unit of their plant that they are increasing their production of sand-lime brick.

Acme Gravel Co., Crystal Springs, Miss., reorganized; A. F. Fleck, general manager, Terry; Geo. Smith, superintndent, Crystal Springs; will develop gravel pit acquired from S. A. Gana.

Beyer Crushed Rock Co., Kansas City, Mo., announced recently that their crusher would cease operation after Jan. 1, 1926. Action was based on complaints by neighboring property owners.

Rudolph Bush, of Templeton, Calif., and R. M. Jennings of Alhambra, Calif., have engaged in business in Monrovia, Calif., as the R. Bush Rock and Sand Co.

Bakersfield Rock and Gravel Co. has begun the construction of its 1000-ton rock, sand and gravel plant in Bakersfield, Calif., that is to cost about $100,000. C. F. Smith is secretary of the company.

Wissota Sand and Gravel Co., Eau Claire, Wis., is operating its plant at Lake Wissota day and night. Large orders of gravel for road material and construction work and chiefly federal aid projects are responsible for the increased activity.

Leaside Brick and Sand Co. have opened up an office in the York Building, Toronto. A siding has been put into their property at Leaside and their sand-lime brick plant is almost completed and will be put into operation shortly.

Marion County Construction Co., Indianapolis, Ind., has tendered a bid of $39,000 for the gravel plant, equipment and holdings of the Eaton-Kaster Gravel Co. of Indianapolis, which is in the hands of receiver F. Paul Jones. The company owns about 40 acres of gravel lands.

W. J. Andrews, Alexandria, Va., has purchased a gravel pit 8 miles from Alexandria. Property consists of 23 acres and will be developed by a stock company to be formed. He is also reported to have secured options of other gravel land in the vicinity.

Allegheny River Sand Co., Pittsburgh, Penn., recently organized by John M. Kennedy, J. K. Johnston and others, are receiving bids for the construction of a modern steel hull digger and a fleet of steel barges. Contract for the 1500-ton dredge has been let to the Midland Barge Co., of Mahonning, Penn.

Indiana sand and gravel companies have had a busy season during the past several months and they are expecting to keep busy until the coming of colder weather. Building operations have been active and there is still a great deal of construction work under way and more is being planned for 1926.

Lime

Florida Lime Co., Inc., Ocala, Fla., is planning to purchase a steam shovel, crawler type, about ¾-yd. capacity.

Cutler-Wagner Lime Co., Duluth, Minn., have awarded general contract to Barnett and Record, Duluth, for a one-story addition 80x125 ft. to replace the portion of its works recently destroyed by fire (See Oct. 3 issue for details of fire).

Cox Lime and Stone Co. will rebuild the hydrating plant destroyed by the recent fire at their quarries near Conshohocken, Penn. The loss to this branch of the lime industry is estimated at nearly $75,000 by Superintendent Walton. It will require about three months to rebuild and restore the machinery destroyed.

Sheboygan Lime Works, Sheboygan, Wis., has started the construction of a new hydrate building which will be finished by the end of the year. The plant is to be 25x90 ft. and will have a concrete foundation and concrete floors on the first and second stories. This year marks the seventy-first anniversary of the company's life.

Cement

Phoenix Portland Cement Co., Philadelphia, Penn., is having plans drawn for an adition to its plant in Nazareth, Penn.

Nazareth Cement Co., Nazareth, Penn., are having built 8 new silos of 80,000 bbl. total capacity, a new raw storage plant and laboratory building. Construction is by the Burrell Engineering and Construction Co. of Chicago.

Hanover and Stone Co., Ltd., have sold their cement plant at Hanover, Ont. Plans of the purchaser are to close the plant and dismantle the mill.

Huron Portland Cement Co., Cleveland, Ohio, has plans under way for the construction of new pack house and silos sufficient to double the present storage capacity. Contract for erection has been awarded to Burrell Engineering and Construction Co., of Chicago.

Indiana Portland Cement Co., Limedale, Ind., a subsidiary of the International Cement Corp., New York, has awarded a general contract to the State Construction Co., Indianapolis, for a two-story and basement addition, 50x100 ft., to cost $70,000. A portion of the structure will be equipped as a laboratory. McGuire & Shook, Indiana Pythian Building, Indianapolis, are architects.

Lawrence Portland Cement Co., Siegfried, Penn., new additions to storage capacity are rapidly being completed. Twelve of the 24 concrete silos have been finished. The total additional storage will be about 260,000 bbl. Burrell Engineering and Contracting Co. of Chicago, were the contractors for the work.

Ideal Cement Co., Denver, Colo., has purchased 20 acres of land near Laporte, Colo., on which it is planned to erect a crusher and gravel washing outfit to provide crushed rock for the concrete work needed in their new plant under erection at Fort Collins, Colo. Transportation for the rock will be provided on the completion of the branch line being built from Laporte to the plant.

Cement Products

Pacific Artificial Stone Works has engaged in business at 33 Shotwell street, San Francisco, Calif.

Rennod, Inc., New Orleans, La., by Edward J. Donner, 549 Pacific Ave., Charles J. Donner, 604 Elmyra St. Manufacture concrete tanks, blocks, etc.

Bogue Supply Co., Morehead City, La., have let contract for 40x125-ft. building of concrete. Will install $10,000 machinery to manufacture concrete products. L. L. Mallard, architect; L. O. Pickering, construction engineer.

G. & M. Concrete Co., Fourth and Oak street, Oakland, Calif., are branching out in the building material field, handling cement, sand, rock, etc.

Otis Cement Construction Co., 419 Hammond Bldg., Detroit, Mich., has increased its capital stock from $50,000 to $250,000.

Shelton Concrete Co. has been formed by F. C. Wiley and H. C. Baker of Centralia, Wis., for the purpose of manufacture of concrete building materials and especially of a new form of septic tank. The company will be located at Shelton, Wis., and plan to operate a sand and gravel plant in conjunction with their cement products operations.

Quarries

Tennessee-Colorado Marble Co., of Detroit, Mich., has changed its name to the Gray Knob Marble Co.

Standard Stone Co., 5997 Gilford Ave., Detroit, Mich., which recently decreased its capital stock from $22,000 to $8,000, has now increased it from $8,000 to $50,000.

E. H. France, Macon, Ga., has bought of W. C. Dougherty a large granite tract near Sparta, Ga. Plans have been made for a modern quarry operation to employ about 100 men.

Oscar Haugen, Ortonville, Minn., died recently in that city. He was a pioneer in the granite quarry business of Minnesota, having established a quarry at Ortonville over 40 years ago.

Parker Rotary Stone Saw Co., Seattle, Wash., have purchased the old granite quarries at Index, Wash., from J. Wallen and A. Erickson for a consideration of $14,000. The transaction includes quarries in British Columbia.

Carthage Stone Co., Carthage, Mo., is stripping a new marble quarry near Carthage. Channeling machines will be installed shortly to determine the extent and quality of the rock and if satisfactory the plans for building a spur track and plant on the site will be carried out.

Marble Cliff Quarries Co., Columbus, Ohio, will soon complete its pulverizing stone plant at Marble Cliff, a suburb of Columbus. This plant is designed to manufacture several sizes of fine limestone, and will have a capacity of 150 tons daily. According to Paul Hodges, assistant general manager, the plant will be ready for operation about November 1.

Kansas City, Mexico and Orient R. R. Co., are to attempt interesting quarry operators in the possibility of establishing at Hugert, Okla., to work a large deposit of granite owned by them. It is claimed by officials of the road that the quality of the rock is exceptional and that the location offers many natural advantages. As an inducement the road would buy the tailings of the operation for ballast.